COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper

Second-class postage paid at Boston, Mass., and additional mailing offices

November 28, 1973 Vol. VII, No. 48

NEWSPAPER

NEWS IN BRIEF

PCI Gets FCC Approval To Begin New Services

WASHINGTON, D.C. With the unanimous vote of the Federal Communications Commission, Packet Communications, Inc. (PCI) gained approval to become the first company to provide packet-switched services to users.

PCI expects to begin service in about 18 months using modified General Automation SPC-16 minis which it will call Packet Switching Processors (PSP) and Terminal Access Processors. A test link in the Boston area including three PSPs and a mainframe is expected to be operational before the end of 1974.

The new common carrier will use 50K bit facilities from AT&T to which it will add its hardware and software to provide terminal-to-CPU and CPU-to-CPU services. Most of the system software for the approved 27-city network has already been completed, and the first minis will be delivered in December, a spokesman said.

MCI Challenge to Bell May Hinge on Duplication

PHILADELPHIA – Microwave Communications, Inc.'s (MCI) court challenge to AT&T [CW, Nov. 14] apparently will hinge on whether the specialized carrier can duplicate the private line services now available from the telephone company.

At issue are Common Control Switching Arrangements (CCSA) and Foreign Exchange (FX) facilities which AT&T offers to private-line customers to provide switching capabilities and access to foreign or remote locations.

At hearings in U.S. District Court, MCI argued that AT&T should cooperate and allow MCI to offer these services in the same way AT&T works with the independent telephone companies. MCI said its economic future is tied to providing the two services.

MCI is asking for a temporary injunction to force AT&T to cooperate on CCSA and FX services pending full hearings later.

On the Inside

Survey Finds Few Move to Cut Power

Energy Crisis No Worry to Some Users

Some Shutting Off Idle Equipment

By Toni Wiseman
and Marguerite Zientara
Of the CW Staff

NEWTON, Mass. – Many DP users are completely ignoring the energy crisis, at least where their installations are concerned, according to a recent *Computerworld* survey. Of the medium to large users surveyed, only one-third are taking steps to reduce their power consumption. "So far we have no reason to believe we're going to be affected," said Robert E. Nelson, DP director at Reader's Digest Association in Pleasantville, N.Y.

And Howard Ricketson, director of administrative systems at Top Value Enterprises, Dayton, Ohio, admitted, "I haven't thought about it too much."

Steps Taken

However, of those who said they were taking action, Kellogg Co. in Battle Creek, Mich., is shutting off unnecessary lights and peripheral equipment not in use during its 24-hour day, as well as reducing the heat to between 65 and 68 degrees, according to J. Schneider, DP manager.

"The next step would be to shut the computer down on Sundays when we don't operate – we run a six-day week. We're really reluctant to do this because when you shut it down and bring it back up you seem to have more failures and we're not sure it's worth that," he said.

At Martin Marietta Corp. in New York City, unneeded peripherals and unnecessary lights in the computer room are turned off.

"If [the energy crisis] really hasn't affected the operation," Gaspar Martinez, DP manager, said, "If anything, the air

"I haven't thought about it too much" – a user

conditioning, by having less equipment on all the time, consumes much less power on its own."

Fred Kupersmith of the Off-Track Betting Corp., New York City, said the firm is turning off lights, turning down heat and has all systems "under investigation. The first step will be to put meters on everything to find out exactly what the power consumption is."

Power Consumption Issue

While most of the users surveyed were not considering acquiring new equipment, many said they would look carefully at the power consumption of any potential new equipment.

"Power consumption will be a consideration, there's no doubt about it," said Ray Parmentier, corporate DP manager for Associated Spring Corp., Bristol, Conn. "But it's one of many factors you consider in ordering a computer. Just because it takes little power you're not going to order it if it doesn't give the desired results."

Martinez claimed that power considerations would have to be evaluated, "especially in major cities. Not only with the energy crisis but because we've already experienced brownouts regularly in the summer. We would get some kind of transformer device for an even flow."

Tom Allyn, DP manager for Walter Carpet Mills, La Puenta, Calif., said he "just got a new machine less than six months ago – it uses a hell of a lot of power and it's only on half as long as the other one was. When I ordered this, I knew it used twice as much power as my old one but I didn't really know at that time it was a problem," he said.

Back to Coal

One-third of the users surveyed have a backup power supply, most of these being diesel generators, while Kellogg Co. has its own power plant and is even considering coal as a power source.

J. Schneider said that if the shortage became acute, he "would shut factory equipment down and keep the computer running. Kellogg's Battle Creek facility performs DP services for several factories around the country.

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Software Patent Threatens Many Users

By Don Leavitt
Of the CW Staff

OTTAWA, Canada – Computer installations doing accounting work here and in the U.S. may be in for legal battles and subject to royalty payments if David M. Homa has his way.

Canadian Patent

The Canadian government late last month issued a patent on a software system the inventor describes as a "revolutionary" approach to management reporting, analysis, financial and accounting operations that are so "fundamental" to business, the patent "will affect practically the entire accounting and computer industry."

The patent was issued to Homa, president of Xoma Ltd., a Montreal-based consulting firm. An application has already been filed for a U.S. patent, and Homa expects that added protection to be granted in 1974.

Meanwhile, Homa warned, "The company intends to proceed immediately to have the value of its invention recognized by the computer industry and to require that reasonable royalties be paid to the company for its use."

What It Does

The system, newly protected under Canadian Patent No. 935,922, "allows business large and small, to make use of today's computers without intricate programming and at a reasonable cost," Homa claimed. The software covers means of separating data coming into a computer into individual transactions, classifying [adding] and then storing acceptable items or rejecting those that

(Continued on Page 4)

Now IBM Sues Calcomp, Charges Plotter Monopoly

By E. Drake Lundell Jr.
Of the CW Staff

LOS ANGELES – What's good for the goose is also good for the gander, IBM seemed to be saying last week as it countersued Calcomp charging that firm had monopolized the market for digital plotters, and therefore kept IBM from entering that market.

Calcomp said it was "studying the suit."

The move came in a week of hectic legal activity on the part of the IBM legal team, in which it dealt with all of the members of the plug-compatible peripherals market presently suing IBM.

Countersued in Three Areas

In its response to Calcomp's suit charging IBM with monopolizing the plug-

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SPECIAL REPORT
On
★ MINICOMPUTERS ★
Follows Page 16

Time Ripe to Act On Privacy Issue, NBS Panel Agrees

By E. Drake Lundell Jr.
CW Washington Bureau

GAITHERSBURG, Md. – Neither technologists nor policy makers will be able to solve the problems of privacy in computerized systems and the threat of its invasion in a vacuum, a symposium sponsored by the National Bureau of Standards agreed here last week.

Agencies, Societies

In addition, the group, which represented some 45 government agencies and officials from 32 states as well as 25 professional societies, heard a clear warning that the problem of privacy of personal information in such systems is worldwide and that possible international standards will be needed to regulate their operation.

Keynoter John K. Tabor, under-

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THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
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Second-class postage paid at Boston, Mass., and additional mailing offices. Published weekly (except: a single combined issue for the last week in December and the first week in January) by Computerworld, Inc., 797 Washington St., Newton, Mass. 02160.

25 cents a copy; $9 a year in the U.S.; $10 a year in Canada; all other foreign, $25 a year. MARGARET PHELAN, *circulation manager.* Four weeks' notice required for change of address. Address all subscription correspondence to circulation manager, Computerworld, 797 Washington St., Newton, Mass. 02160

Computerworld can be purchased on 35mm microfilm in half-volumes (six-month periods) through University Microfilm, Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone: (313) 761-4700. ab

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Energy Crisis No Worry to Some Users

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"We are probably unique in that we generate probably over 50% of our power ourselves. We have an oil generator, so if they cut back on the oil we'll have to go back to coal like it used to be, which we are investigating anyway," Schneider said.

Nelson of *Reader's Digest* relies "entirely on the public utility. If they cut back voltage more than 8%, we have to stop, that's all."

Walter Carpet Mills uses "a lot of fuel of some sort – either natural gas, butane or we can even convert diesel if we have to," noted Tom Allyn. "We also use quite a bit of electricity for all of our motors, so if we have a critical shortage, it's going to shut down my computer. It's also going to shut down my mill and three days after the mill shuts down it won't make any difference."

However, Top Value's Ricketson offered, "Here in Dayton we've been told that things look very rosy for us, so I guess that's the reason we really haven't thought about it too much. We haven't had the problems that have been evident, especially on the East Coast, and our company said last week in effect there was plenty of power available for this winter."

When asked how a mandatory four-day work week would affect their operations, several users responded with, "terribly," "seriously," "not too well," "it wouldn't get done" and "it'd make it impossible." Most are not considering moving to a four-day week and most are now running a six- or seven-day week.

Tom Allyn favored a four-day week, noting the reduced week would hurt production capacity for the mill, but "it wouldn't affect me except for the fact that if my order board is open I have to service the customers. I could do as much work as I'm doing now because I do many things today and again tomorrow with new input."

Dean Taff, director of computer operations for Braniff International Airlines, said that even if a mandatory four-day week went into effect, "we'd run 24 hours a day, seven days a week unless they shut the airlines down. We have to fly airplanes around the clock so we have to keep our computers running around the clock."

Ray Parmentier commented that one of his operation's biggest problems is reporting daily production – what each plant is doing – but he added that in the future consolidation might be possible, to process two days' data at once.

Bruce MacIntyre, DP manager for Administrative Management Services, Canonsburg, Pa., observed that with a four-day work week, "we'd just lose customers."

Gaspar Martinez claimed that "in this instance they [the government] would be cutting back their own workload since we have several government contracts."

Echoing this idea, Beth Whited, DP manager for St. Anthony Hospital in Denver, Colo., declared, "Then we wouldn't submit all the 14 copies the government needs."

Open Bids Linked to Master Plan

By a CW Staff Writer

LINCOLN, Neb. – Nebraska state senators are more likely to accept open bidding once they can look at a written master plan for all state data processing, according to Ernest Kovaly, the state's data processing administrator. Therefore, the state has set the wheels in motion for a long-term DP plan expected early next year.

Although other state agencies and schools use independent suppliers, Nebraska's central DP installation has had a no-bid arrangement with IBM for over seven years.

Conversion Concern

"I think what they were primarily concerned about," Kovaly said of the senators, "was the conversion effort and no definition of future requirements down in writing, where someone can plan long-range-wise and make a determination of priorities."

Some senators had objected over a year ago when Gov. J.J. Exon said he wanted "to see if the same services and equipment could be obtained for less money" for the facility.

The governor's director of administration began investigating other vendors, but reportedly ran into opposition from a combination of state senators and IBM personnel [CW, March 28].

The governor declared it was not the state's position to "turn IBM out" but neither would he be frightened off."

Task Force Named

An investigating team brought in from the Council of State Governments recommended Nebraska draw up a long-term plan on computer use before deciding on the vendors.

The governor appointed a 12-member task force with representatives of the major state agencies using DP.

The task force sent out questionnaires to 90 state agencies and schools. The total master plan should follow by February 1974.

The plan will need the approval of both the executive and legislative branches of government. After that, Kovaly said, determination will be made on the resources available, what resources would be required, and then "the decision will be made go or no-go on bids in the various areas."

IBM Charges Calcomp Monopoly

(Continued from Page 1)

compatible peripherals market, IBM not only denied the charges, but countersued Calcomp in three areas, charging that firm with misappropriation of trade secrets, patent infringement and monopolization on its own.

In the trade secret area, IBM said that almost all of Calcomp's profits since 1968 have come from misappropriation of IBM trade secrets and asked for damages of that amount which would be determined later.

IBM also asked the Federal District Court here to levy a $20 million "exemplary" fine against Calcomp for the alleged misappropriation.

In the patent countersuit, IBM said it would request an amount to be determined later for Calcomp's alleged willful infringement of the IBM patents.

On the monopoly charge, IBM strongly pointed out it "does not believe that the EDP market can be divided" into submarkets as is suggested by Calcomp and was found by Judge A. Sherman Christensen in the Telex case.

However, IBM said if the courts accept the market defintion put forth by Calcomp (and accepted in the Telex case), then, and only then, the same principles would have to apply to the plotter market and the courts would have to find Calcomp guilty of monopolization of that submarket.

Damages for this claim could be determined later in the case, IBM said.

In the other action on the legal front last week, IBM filed a motion with the appeals court in Denver in the Telex case, petitioning that court for permission to appeal and pointing out the need for an expedited appeal in the case. In it the firm clearly outlined its strategy for the appeal.

The IBM-suggested schedule for the appeal would have IBM filing the major brief in its appeal by Jan. 8 of next year with all of the briefs required of each side in the court before the middle of March.

The final action came with a filing against Transamerica Computer Corp. which is suing IBM on much the same grounds as the Telex case and Calcomp case and was generally a *pro forma* denial of the charges.

4½ Years Later It's Operating...Partly

Poor Planning Hurt Model Crime Program, Critics Say

By Marguerite Zientara
of the CW Staff

ST. LOUIS, Mo. – Four-and-a-half years after the St. Louis Circuit Court's computerization program was praised as the "pilot program for the whole nation," critics have blamed too little planning and too little federal supervision for certain unfulfilled goals of the program. In the program's defense, Circuit Judge Carl R. Gaertner claimed "the major part of the program is completed and is definitely operating." He stated that the one completed project has 27 components to it, whereas of the six uncompleted projects each has one component.

The computerization program began in 1969 as the brainchild of Circuit Judge Thomas T. McGuire, who served as its first project director. McGuire also served on Region Five of the Law Enforcement Assistance Council, the agency which has disbursed most of the project's funds.

Conflict of Interest Possible

In November 1970, McGuire resigned as director when he was informed by federal officials that his dual role might present a conflict of interests. At that time, John S. Wilson took over as project director.

In McGuire's original application for $8,900 in federal money, he set up two projects that were to be accomplished within six months of receipt of the money:

- A complete history of every criminal case.
- An attorney listing to expedite the assignments of lawyers to indigents.

The first project, the only one in the four-year program to be completed, was plagued with problems from the start and in the end took almost two years.

More Money Needed

Soon after the start of that project it became apparent that more federal money would be needed, so two grants of $18,000 each were approved, making a total of $44,900 of federal money available during the first year. As an in-kind match to the federal money, the City of St. Louis contributed $20,140 worth of personnel and computer time.

Then the problems really started mounting. The first programmer quit to take a better job within two months of being hired.

In December 1969, three months before the project was to be completed, Wilson turned to write the programs. Wilson said records show IBM received at least $17,000 for its work, almost all of which was later redone.

In the spring of 1970 a new computer expert was hired who, over the next 12 to 14 months, wrote and rewrote more than 20 programs aimed at accomplishing the first goal of an "automated system of inventorying and accounting for all criminal cases." Of the more than 20 programs written, only about five or six were ever used regularly, according to the programmer, and only seven of them were distributed at all.

Six other projects slated for the same plan are still being worked on or were dropped completely:

1. Computerization of the fines, fees and bond accounting procedures in the office of the circuit clerk for criminal causes. This project, according to Judge Gaertner, was "not completed."

2. Computerization of the jury commissioner's records. This project was not completed, and is now "in process," according to Gaertner.

3. Automation of the state probation and parole office. According to Gaertner, that office was already hooked into a national organization which furnished the needed information to them. The planners didn't realize that at planning time.

4. Establishment of an on-line capability for the entire court computer system, with CRTs on the judges' benches. Gaertner said there was "no need for that."

5. Establishment of an attorney listing service to expedite the assignment of lawyers to indigents. This project was completed in about four months by the programmer but a few weeks later the Missouri Supreme Court ruled that lawyers could not be forced to defend indigents, thus making the program useless.

6. Development of a jail census. This project is now in progress, according to Gaertner.

The circuit court has now decided to tie in with Rejis Corp. (Regional Justice Information System), a non-profit organization funded by the Law Enforcement Assistance Administration (LEAA) and user cost "in proportion with use," according to Allen Hamilton, general manager of Rejis.

Applications Provided

Rejis, located in St. Louis, will furnish the "standard array of applications in the court area," Hamilton said, including docketing, calendaring and attorney conflict scheduling.

Rejis, according to Hamilton, is "like a service bureau for all the criminal justice agencies in the metropolitan area. We will be doing work for the jail, the city workhouse, county workhouse and the 63 police departments in St. Louis."

The regional system will be independent of the National Crime Information Center, Hamilton said. "They will be able to access NCIC but will not input information into the system."

Clear Up the Airway, Improve Reception

VICTORIA, Australia – Are you suffering from ionospheric irregularities? A computer at Latrobe University is analyzing ground- and satellite-based measurements of such irregularities in an effort to improve the prediction of short-wave broadcasting reception and distribution of standard frequency broadcasts. The studies are being conducted by the university's physics department.

The university's configuration consists of an Interdata Model 70 with 16K bytes of core, high-speed paper tape reader-punch, digital flatbed plotter, analog-digital conversion equipment and 7-track magnetic tape.

In one application on this system, Doppler information from standard frequency broadcasts is first received on slow-speed analog tape at the Neveridge Field Station just north of Melbourne. It is then played back at high speed and digitized on magnetic tape or fed directly to the computer. A Fast Fourier Transform analysis is performed on the bulk of the data.

Privacy Panel Agrees: Time Ripe

(Continued from Page 1)

secretary of commerce, said the rapid growth of computerization at all levels of government and industry had put the issue of privacy on a "collision course" with the developing technology, but added the present time is ripe for focusing on the problem and acting.

Rep. Jack Brooks (D-Tex.) indicated computers were "here to stay" and the challenge was to control the side effects of computerization and not just to rail against their use.

Brooks added there was a need for a broad national policy in the field of privacy in computerized systems, indicating the nation has hardly taken its first steps in this direction.

But at the same time, he said, the broad policy recommendations adopted by Congress and others would be unworkable unless computer users and technicians could develop ways to make their files and centers secure.

At the same time, Brooks declared that "this is a great time for a breakthrough" in the area of personal privacy since the nation is concerned over abuses to personal privacy uncovered by the Watergate investigations and Congress is receptive to ideas on how to better protect personal information in record-keeping systems.

Dr. Ruth Davis, director ot the NBS Institute for Computer Science and Technology, said we are now past the time of stating that privacy is a big problem and are at a stage where we can break the problem down into its component parts and assign responsibility for solving those parts.

At the same time, Davis cited a crying need for "national coherence" in the area of privacy considerations since the more than 70 privacy bills pending in state legislatures and the dozen or so in Congress could lead to a "conflicting morass" of regulations even if just a few were actually passed.

The three major efforts that should begin today, she noted, are:

- The development of uniform operating procedures for all installations with personal information on file, including physical and administrative security guidelines.
- Coordinated research and development between users, industry and the government on the best methods for making systems secure.
- Finally, she said, there should be work done in the area of innovative applications of the technology that is already on hand, such as encryption and equipment lockouts as well as the research in new fields.

The warning on the international scene came from Prof. Alan Westin of Columbia, who indicated the problem of privacy was one shared by every industrial nation to some degree and there was a growing need for international guidelines to protect privacy.

At the same time, a cautionary note was raised by James B. Rule, associate professor of sociology at the State University of New York, who noted the "critical emotional questions in the interrelations of computers and men are political questions" that cannot be solved by technology alone.

Access to Initiative Petitions Limited

By Marvin Smalheiser
CW West Coast Bureau

LOS ANGELES — The Los Angeles County voting registrar's office has discontinued the practice of permitting police agencies, some politicians and some private parties to learn what initiative petitions voters have signed.

Registrar-Recorder Leonard Panish stopped the practice after finding that police and other persons could determine initiatives a voter had signed by checking a computer record of code names identifying initiative petitions.

The registrar-recorder's office has to verify that signatures on an initiative petition belong to eligible voters.

While checking the names on voter files, the code name is put on the voter's affidavit. A file of the code names considered public record has been open to the public.

But Panish said he felt the procedure constituted an improper invasion of privacy.

It was reported the lists were used as part of police background reports on appointees to municipal or county offices.

Code names will still be used in verifying petition signatures to make sure a voter is eligible or doesn't sign a petition twice.

But the particular code of the petition will be eliminated once the check is completed and all past codes will be deleted, a spokesman in the registrar-recorder's office said.

Software Patent Threatens Users

(Continued from Page 1)

don't match predefined standards and displaying the unacceptable transactions to the computer operator.

The system also provides means of rolling totals at control level breaks and either clearing accumulators or protecting them against inadvertent destruction. The patent apparently also covers means of generating transactions internally to keep general ledger accounts in balance while controlling the amount of input needed to feed the system.'

There is nothing in the patent document itself that indicates what language the system uses or what hardware environment is required to support it. There is an implied warning, however, that any programmed applications that come close to the claims made for this patent would be considered as infringing on it.

Patents in Canada do not include source listings or other specific details of the program logic needed to implement the invention described in the language of the patent, according to a ruling of the Canadian Patent Appeals Board. The current patent, however, includes a narrative example and various flowcharts to indicate the scope of its logic.

Bell Opened Door

The legal battle to gain protection for Homa's system began, he said, in late 1969 and has been led by Robert M. Barrigar, an Ottawa patent attorney who was counsel on the Bell Laboratories software appeal "which opened the door to inventors to obtain patent protection for computer software."

The time lag between original application and issuance of the patent has created some problems, particularly in the area of unintentional infringement, Barrigar noted.

"Some inventions are discovered far enough ahead of their time so that when a patent is issued no one at that time is infringing. Other inventions [are] in such a fast-moving field that when the patent is finally issued, practically the entire industry is already making use of some feature of the invention, such as in this case," he said.

Canadian service bureaus offering accounting and managerial support to outside clients have already been warned through form letter that they may be infringing on Homa's patent, but even firms with their own in-house computers may feel the impact of this patent, the attorney continued.

Industry observers tend to take seriously Homa's intention to seek royalties, thus far unspecified, for use of his patent and urge installations that see any possibility of infringement to review the language of the patent with their own attorneys.

Copies of the patent may be obtained from the Commissioner of Patents, Patent Branch, Department of Consumer and Corporate Affairs, One Place du Portage, Hull, Quebec K1A OE1. There is a charge of $1 per copy, and checks or money orders should be made out to the Receiver General of Canada.

Computerized Traffic Signs Make 'Sense'

By Marvin Smalheiser and Marguerite Zientara
Of the CW Staff

Los Angeles, Denver and the New Jersey Turnpike Authority have all come up with the same idea of computerizing traffic signs on major highways to improve traffic flow and make travel safer.

Los Angeles is in the forefront with a system in operation for two years. Forty-two miles of freeway are under electronic surveillance by means of sensors in the pavement and a communication system linking helicopters with tow trucks and police, according to Albert Perdon, assistant highway engineer for the freeway department.

The 800 sensors are polled 15 times per second by a Xerox Sigma 5, which then analyzes the rate at which cars are moving. In a central control room, information is flashed every 20 seconds onto a display map illuminated by lights representing measurement points, showing whether each point has a smooth flow of traffic, congestion or a tie-up.

Helicopters

The Los Angeles system is unique in its use of helicopters, which the other two systems will not use. They send pictures of any incident area via closed-circuit television to the control station to help direct assistance vehicles. Tapes of those pictures are also used for training.

Besides the Sigma 5 with 28K memory, the system's hardware includes a Data General Nova 1220 with 16K that controls signs on the Santa Monica Freeway advising motorists of freeway conditions. A line printer, card printer, card reader, keypunch, two teletypewriters and two CRTs complete the system.

The Denver system, now being installed on sections covering 28 miles of interstates 25, 70 and the Denver-Boulder Turnpike (U.S. 36), is expected to be operational by April 1974.

Detectors in the pavement at half-mile intervals will sense traffic flow and send electronic messages through underground telephone cables to a Honeywell H-316 computer, according to R.J. Boyle of Honeywell Traffic Control Operations.

The computer will be monitored by traffic engineers from the highway department in a master control room, also with a display map. Data from the detectors will be interpreted by the computer which will then activate the message signs to advise motorists on traffic conditions.

A similar system is in operation in greater Chicago.

The New Jersey Turnpike Authority expects to have its system working by the end of 1975, having just awarded the contract to Revenue Systems, Inc. of Plainview, Long Island, N.Y.

Sperry Systems Management Division designed the system, which is based on a PDP-11/40, and will install it.

The New Jersey system will cover 35 miles stretching from Interchange 9 at New Brunswick to the northern terminus.

This system also will use electronic sensors located at half-mile intervals and a control center at East Brunswick will be manned 24 hours a day. The sensors will detect traffic build-up and automatically, via computer preprogramming activate signs to post a reduced speed and to identify the problem for the motorist.

The New Jersey system will use lighted signs already in operation under a different system. At the present time patrolling state police report any trouble on the highway and the sign operators are then directed to change the wording on the affected signs.

The New Jersey control room will be manned by a traffic engineering dispatcher from the New Jersey Turnpike Authority and, like the other systems, will have a wall panel map and CRT. The CRT will furnish further pertinent data such as the average number of vehicles passing each point in the system, the average speed of the vehicles and will serve as an early warning indication of any traffic problem.

Best Route

When a problem is detected, the CRT will also furnish police with routing information to enable them to get to the trouble spot by the shortest possible route.

The Los Angeles project is the most expensive, at $8 million; New Jersey follows with $5 million system, "from design to implementation," and the Denver system is being installed under a $380,000 contract.

Smooth-Flowing Transportation

DP Proves Answer to Complex Seattle Port Problem

By Robert L. Glass
Special to Computerworld

SEATTLE — An estimated 35,000 jobs here are dependent on the Port of Seattle. (The systems and data processing organization accounts for 42 of those!) About $300 million worth of facilities are managed by the port; 500 accounts do regular business there.

On the Waterfront

In an urban sprawl often thought of as dominated by the Boeing Co., the port has a major, if quieter, impact. And data processing, in a role unique in this field, paces that impact.

In a giant old warehouse on the waterfront is a systems analysis organization, the backbone of transportation data processing.

What sails into Seattle's Elliot Bay now ranges from barges and tugs to the latest and largest Japanese vanships. And the task of managing the port's complexity has increased dramatically, with computing leading the way.

In fact, Port of Seattle activities are not limited to seaborne transportation. Sea-Tac Airport, 747-big and highly automated, is also a part of the port.

Inside the port's ancient building one discovers a modern and spotless office complex. To the right, through the double-glass doors labeled "Systems and Data Processing, Clifford Muller, manager," is the analytical and electronic pulse of the port.

Glass-windowed and carpeted offices, housing two or three systems analysts each, are furnished with desk-and-storage units designed by one of the organization's own people with a flair for the niceties of architecture. Through the glass one sees remote terminals, both CRT and hardcopy, scattered through the offices. Clearly, this is no quill pen and tall stool operation.

But where is the computer?

That omission is purely intentional. The Burroughs B4700 resides in a small side room, surrounded by its electronic umbilicals and peripherals, communicating quietly with its batch workload and its 38 remote terminals.

No one gets in the computer room without a specially printed magnetic key card, and the key "combination" is changed every three months. Still another key card controls access to the separate mass storage room where the disk storage units house the port's centralized data base.

There are three reasons for the security, says Cliff Muller — to increase operator productivity, to keep technical employees from congregating there for conversation and to "keep risks down." Risks, of course, are primarily those of malicliousness or theft.

But there is another, quite important risk. The port's DP capability is "number one in the U.S. in terms of transportation systems," according to Muller. And in the highly competitive port business, where Seattle ranks among the nation's top 10 ports, that unique advantage is worth protecting. Visiting managers from other ports are definitely not invited to tour the port's DP facilities.

What Happens?

What kind of problems are solved in a port's DP operation? Primarily, transportation problems are the concern. What's arriving on the T.S. Queensville from Bangkok? What parts is Arco oil bringing in by Burlington Northern for the North Slope oil fields? When does the Hotaka Maru arrive, and what's in those 40-foot containerized cartons?

Twenty-one different DP systems are in operation, processing one-and-a-half million transactions in 1972 (by 1978 that should increase to 28 systems).

Accounting, which once made up 98% of the port's data processing, is now down to 17% as more sophisticated applications continue to evolve. The remainder of the port's workload is scientific, primarily warehousing structural design.

At the coding level, also, Muller minimizes risks. Assembly language is banished, except as a last resort. Cobol and Fortran are the required languages. A thick software standards document spells out the rules, and supervisors monitor programmer conformance, including browsing through listings to make sure those rules are followed.

Review Board

At a higher level, the three top port executives and Muller make up a data processing review board, monitoring planning and direction and keeping DP in tune with the port's highly business-oriented goals.

It's a problem-oriented shop. "Hardware," Muller said, "should be transparent to the user." When the changeover from a B3500 to the B4700 (necessitated by the increasing size of that one-and-a-half million transaction load) occurred last December, the transition and parallel run time was accomplished in two weeks. The remote terminal support was checked out on the new system on weekends by analysts working overtime, to insure that those 38 remote sites wouldn't have to realize a new computer was on the scene.

Why remote terminals? "Time equals money" to the port's customers. Batch processing was simply not fast enough for shippers who want cargo to move, not settle into warehouses. Paperwork movement paces cargo movement.

To speed that paperwork, terminals are placed in "high payout" customer facili-

(Continued on Page 7)

Thinking Security? Consider Water Protection

TORONTO, Ont. – Is your computer installation secure?

A simple way to determine the security of your system is to check it against the following security musts concerning water protection and computer center access control:

- Include drains and channels in the building design to protect against water damage if the building's waste or water pipes burst or if there is a fire on the floor above.
- Locate shut-off valves for the sprinkler and air-conditioning systems and the building's water supply in accessible and clearly marked positions.
- Inspect walls for holes drilled to install telephones or electrical outlets to see that they have been sealed to protect against water leakage. Ensure these outlets are above the floor. Ensure junction boxes are above recessed floors.
- Keep plastic covers for computer equipment available and clearly labeled to cover each piece of equipment to protect it from dust during construction and from water produced by sprinklers used in firefighting.
- Designate the computer center as a "restricted area" where access is limited to authorized personnel.
- Monitor access to the computer center during normal working hours by a receptionist at the entrance, and after working hours by a security guard service, a closed-circuit TV system or an alarm system.
- Have visitors sign a log book when they enter or leave the computer center, and do not allow visitors into the center after working hours.
- Have employees and visitors wear badges to designate access limitations.
- Periodically inspect the schedule of persons, including cleaning staff, who have access to the operations area in order to ensure there is no time when no one, or only one person, is in the computer center.

This checklist was compiled by DCF Systems Ltd., 74 Victoria St., Toronto, Ont, M5C 2A5.

DP Solves Seattle's Problems

(Continued from Page 6)

ties. A hot line telephone without a dial at the computer console allows simultaneous information broadcasting to all remote sites.

And then there's the Sea-Tac Airport. The port's computing responsibilities there are mind-boggling. Sea-Tac is the epitome of process control applications, with computers running everything from escalators to air conditioners. Two Data General Supernovas are just now being installed in the airport's central control center.

The Westinghouse P2000, which controls the fully automated underground rapid-transit system, is already at work in the control center, and the port people have the software maintenance responsibility. All told, there are 15 subsystems under control of automation.

There's more for the future. One of the seven additional systems to be added under the port's current five-year plan is a data base link between the waterfront B4700's massive disk files and the airport nerve center Supernovas.

Grant to Aid Municipal Data

IRVINE, Calif. – Researchers of the Public Policy Research Organization at the University of California here have been awarded a $129,000 grant to examine existing policy-relevant research on municipal information systems.

"When we speak of policy-relevant issues, we include such items as the contribution of EDP systems to municipal effectiveness, the parameters of data control, the aspect of individual privacy, EDP investment and finance, manpower aspects of EDP and so on," said professor Kenneth L. Kraemer of the UCI Graduate School of Administration, the principal investigator in the project.

"Our goal is to assess the technical adequacy and policy utility of existing research that is relevant to municipal information systems. This assessment will be synthesized for use by policymakers and will help to guide further research efforts," he added.

Recycle That Data

EAST LANSING, Mich. – Data, recycled from computers, is a valuable resource which is being ignored, according to a husband and wife team of professors from Michigan State University.

Dr. Bernard M. Finifter, associate professor of sociology, and Dr. Ada W. Finifter, associate professor of political science, have advocated the use of computerized data banks for scholars doing research and teaching research methods.

Social science findings are highly vulnerable to the vagaries of chance and misinterpretation, according to Bernard Finifter, and therefore reexamination of previous research findings is useful in determining the reliability and validity of new findings.

Ada Finifter asserted, "Students can better understand the interaction between fact and theory, and between data and ideas, when working with already gathered and computerized data."

Editorial

The Energy Crisis

So the energy crisis is upon us.

Whether the fuel "shortages" are politically inspired whether they stem from a runaway conspiracy to control prices, or whether the problem is truly out of hand, is academic. The truth is, at least for the short term, we have an energy problem.

And many computer users appear to be ignoring the facts. Preliminary results of a *Computerworld* survey indicate an "it-can't-happen-here" attitude. While some users admit it can happen, they are doing little to protect their centers.

It is time to prepare contingency plans: What happens if a reduced work week is mandated by state and/or federal governments? What reports can be eliminated if buildings (and therefore data centers) are to be closed down after the "first shift"? What happens if power companies are forced to cut voltage by more than 8%? What happens to files if disks and tapes are in short supply?

Many people fear big business has caused an artificial shortage [see Herb Grosch's column], but regardless of the cause, a short-term crisis needs to be dealt with.

Even if a longer-term crisis is avoided, users should begin emergency plans for the winter.

A Carnival of Greed

We are seeing on the very grandest national scale, a corporate ripoff, a carnival of greed and ugliness, which makes puny little swindles like VS look as pure as the driven snow. I'm referring to the energy "crisis," and more particularly to the gasoline/oil/gas scenario.

Before I go on, let me assure overseas readers I realize there is a very genuine problem in Western Europe, and a hideous one in Japan. The swindle is of Americans, by Americans.

Now, input/output experts, start thinking: have we stopped pumping or refining our own oil? No! Have we reduced imports from Canada or Venezuela or any non-Moslem offshore source? No! Have we crippled our refineries and pipelines? No! Have our gas wells been capped? No! Will the *reduction* of Arabian oil and Algerian gas imports amount to more than 2% of our total consumption? No!

System experts, start thinking: does it cost more per barrel or BTU to produce, transport, refine or distribute the supposedly scarcer petroleum products? No! Is there then any reason for prices to go up? No!

Again, I accept upward cost trends and inflationary pressures over the long term – the "smooth curve" sort of thing. I'm inveighing against massive recent and proposed jumps.

The whole thing is clearly a greedy conspiracy, designed to get the Alaska pipeline built, nuclear reactors defueled, automobile emission controls dismantled, utilities de-regulated, huge dumb car models selling again, and above all, to generate enormously higher prices and profits for the oil and automobile companies and the utilities.

Not only is the regressive nature of this distribution "mechanism" shameful – keep the poor people cold, dark and off the road – but if one *did* accept pricing as a method, the surplus profit ought to be taxed away and used to build mass transportation and clean up strip mining and oil spills.

For the sake of our future, for the sake of our kids, don't let these horrible people get away with it!

Herb Grosch

Forbes 'Misunderstood' EFTS–Privacy Not the Issue

By Dale L. Reistad
Special to Computerworld

Rep. John R. Forbes of the Florida House of Representatives has set an all-time record for misunderstanding the subject of electronic fund transfer systems (EFTS). As quoted in the Nov. 7 issue ("EFTS vs. Citizens' Rights – Banks' Power Questioned"), Forbes was at least consistent on EFTS – he misunderstood and/or misinterpreted every aspect of the subject he dealt with.

With EFTS changes taking place at such a rapid rate I rarely have time to respond to the commentary of those who are strangers in this complex area. In this instance, however, there was such a cluster of nonsense I have no choice but to react.

What really bothers me is that the Forbes speech was supposedly researched in depth by one of his staff assistants – and that the search was almost totally oriented toward finding an "invasion of privacy" issue which Forbes could tackle.

Some of the direct quotes of Forbes' speech to the Digitronics Users Association meeting in Atlanta, and my analysis of the issue referred to follow:

Forbes: "The trend toward computerization disturbs bank customers."

Utter nonsense – surveys are quite consistent in showing that most bank customers are positive in their reaction toward the use of computers. As a matter of fact, the consumer tends to be more trustful of unattended equipment (cash dispensers, for example) than human tellers.

Computerized records are more credible in the eyes of the typical bank customer than manually prepared records are.

In a recent survey which my company conducted in the Pittsfield, Mass., area trained interviewers probed consumers on the so-called "invasion of privacy by computers" issue.

The result – no consumer concern.

Forbes: "In effect, banks would be substituting their own credit for that of retailers or other competitors," and "The effective control over credit (by the banks) and the exclusion of non-banking institutions from EFTS poses serious ramifications for consumers."

Whatever Forbes is talking about, it isn't EFTS. In EFTS

Viewpoint

the vast majority of consumer transactions are debits not credits. They are electronic replacements for transferring funds already on deposit – not purchases against a credit line.

Forbes is confusing credit cards with EFTS, the typical mistake of an outsider engaged to give a speech about a subject he is not familiar with.

In EFTS the merchant credit program is actually enhanced, not weakened, and the typical merchant reaction is favorable to the concept. As for the consumer, EFTS adds a new dimension of fund transfer convenience, which when properly used, is a powerful new companion to credit.

Computerworld on Forbes: "Under today's systems a user can have multiple credit cards, and failure to pay on one card will 'not necessarily halt the flow of credit,' But with EFTS, failure to pay certain bills could effectively halt or limit a user's line of credit, 'whether the consumer was justified in his actions or not,' Forbes warned."

Again, Forbes confuses debit and credit cards. Be that as it may, the issue of one card vs. several is a relevant one, even in the debit environment. Unfortunately for the EFT System (but fortunately, perhaps, for the consumer), there will be multiple debit card holdings just as there are multiple bank credit card holdings.

Every financial institution will want its customers to carry its own debit card, knowing full well that the average consumer has two or more bank affiliations – and will be receiving other cards from other institutions. In the EFTS debit card environment, multiple cards are no more dangerous than the multiple checkbooks or passbooks customers carry today.

Forbes: "Computer records of financial transactions under EFTS would indeed be valuable, centralized, comprehensive and readily available. The individual's right to privacy versus the right of society to know is at issue in this [EFTS] system."

The plot thickens. Having confused the credit and debit card business, Forbes now tackles the "invasion of privacy" issue. The premise is natural enough – if one believes that–in EFTS all records are centralized into a single dossier.

This was an item of considerable concern to me personally when, in the mid-1960s, this issue was addressed by the American Bankers Association's Automation Committee, which was then under my direction.

But research indicated that in the EFTS environment, it would be much too cumbersome to attempt the single-account data base structure. More appropriately, a new account, or a subset of an existing account (checking or savings) would suffice for the routine debit transfers.

Today, 10 years later, the concept is generally accepted. The EFTS computer – if indeed one is necessary – will have a minimal record containing a customer's account number, secret ID code and prearranged limits for debit transfers.

No name is required, no address, no balance information, no credit information. At the end of each processing day, this information is transferred from the EFTS computer to the data processor of the individual financial institution.

What Forbes mistakenly said "is at issue" in EFTS is no issue at all. Indeed, EFTS records could be published in the local papers without divulging a thing, and EFTS companies worth their salt will insist on keeping their records as pristine in the future.

Forbes: "No technological safeguards will ultimately curb all abuses and risks that EFTS carries. Security must strive to keep pace with technological advancements, but that is not enough. There should be legislative redress for consumers harmed by the checkless, cashless society."

I can almost hear the legislator squeeze out the last three words! What abuses does Forbes have in mind – the credit constraints which he has mixed into EFTS in his confusion? The myth of "invasion of privacy?" What redress does the consumer need from a technological improve-

(Continued on Page 10)

Letters to the Editor

Bravo, Cheryl Johnson!

Too bad we can't appoint Cheryl Johnson [Letters to the Editor, CW, Oct. 31] to the Supreme Court.

But then, who ever heard of anyone on the Supreme Court using good old common sense?

Vince St. John

Monroe, N.Y.

Down With Antitrust

Congratulations. The two letters from Cheryl Johnson to Telex Corp. were a breath of fresh air. It was doubly encouraging to see them appear in *Computerworld*. I had begun to wonder during CW's coverage of the Telex-IBM suit if CW desired anything less than the death of IBM. Printing Johnson's letter lessened that fear somewhat.

But far more important than the chink in CW's anti-IBM armor is Johnson's attack on the antitrust laws. To call these decrees laws is stretching the truth.

A business man can be prosecuted for almost any action under the aegis of these "laws." Underpricing your competition can be termed destructive competition, overpricing is termed price-gouging and charging the same price as your competition is price-fixing.

That CW printed an attack on the laws is to be commended and I hope such open-mindedness is the sign of things to come.

I must comment on one remark by Johnson. She wonders why no one else stepped forward to speak up for IBM. The answer is IBM's performance in the case. This would have been the ideal case to take before the Supreme Court and the nation as an assault on the antitrust laws. IBM failed to do this and tried rather to snow the opposition with an avalanche of paper and court proceedings.

The failure of IBM to attack the antitrust laws, along with its dealings with communist nations, indicates IBM is not aware of those elements of our political system that made its success possible. Let us hope IBM discovers those elements before the next antitrust case comes along.

Robert Arning

New York, N.Y.

Persecuted Minority

As numerous articles in *Computerworld* attest, "big business" is under ever-increasing attack from certain segments of the public and, most dangerously, from the government. The regulatory stranglehold on American business continues to tighten.

Since *Computerworld* owes its very existence to "big business," it is crucial to understand the issues involved in these attacks in order to effectively repel them. The life of CW depends on it.

For a brief indication of these issues, I recommend Ayn Rand's pamphlet, *"America's Persecuted Minority: Big Business."* For a more thorough, in-depth analysis, I recommend *Capitalism: The Unknown Ideal*, also by Ayn Rand.

Joe Wright

Forest Hills, N.Y.

When I became editorial director of CW last summer, I promised to allow letters from our readers to speak for themselves, since I had ample opportunity elsewhere in the paper to lay out my views. The three letter above, plus some overscribbles on my "Santiago, Moscow and Ottawa" column [CW, Oct. 10] from one Mel Jones of Collinsville, Ill. – the "How can you be so stupid?" sort of thing – represent a political viewpoint. Call it right wing, call it Ayn Randite, call it Bircher (Jones enclosed three John Birch Society reprints), it is a special perspective that writes off the laws of the land as foolish and immoral, not worthy of obedience, when they get in the way of the writer's economic/political prejudices.

Now, I'm at the other end of the spectrum; I'm disturbed, not gratified, at Jones' FBI informants and Arning's contempt for the antitrust decrees. But I have a forum; I can brandish my opinions on CW's editorial page.

Should I henceforth suppress right-wing comment (note that I haven't, so far)? It would be an easier problem if we had a balancing flow of left-wing suggestions: nationalize IBM, socialize software! But we don't. I would appreciate reader comments before I decide. HG

Telex Supporter

This letter is not an official comment by Telex Corp., but is a personal comment by an employee who is offended by the vituperative letters entitled "Immoral Action" and "More Outrageous" published in the Oct. 31 issue of *Computerworld*.

I don't know who Cheryl L. Johnson is nor what her background might be, nor do I understand why her letters deserved so much space. It would seem in light of the newsprint shortage that CW's supply could be put to better use than to carry the apparently ignorant and naive ravings of one who judges the strength and worth of a corporation, the basis for what has made America great, and what is and is not free competition from her reading of the *New York Times*.

If Johnson has the time, aside from writing letters, I suggest she read the text of Judge A. Sherman Christensen's decision to become informed on what free competition is, and that she take the time to find out who Telex Computer Products is and how it pioneered a market which resulted in significant benefits to the DP user.

This market was initiated through introduction of a magnetic tape drive of a design which was, and is to this day, unique to Telex and which was, and is, an improvement over the "plinch puller" 729 and 2401 tape drives which IBM perpetrating on the DP community at outrageous prices.

IBM has indeed done outstanding work in many areas of technology. It does not, however, have exclusivity in the area of "brains" as Johnson seems to believe. For example, IBM did not pioneer "single capstan tape drives" (Ampex did) nor did it pioneer "phase encoding" known for over 25 years as Manchester recording (for Manchester University in England where it was developed).

This is not to imply that IBM does not indeed pioneer advances in technology; it does and significantly. However, to discuss others summarily as "worthless" and "unoriginal" is stupid in the true sense of the word.

To be called "immoral" and have Telex's as yet unconfirmed relief declared "outrageous" seems inappropriate reward for attempting to rectify oppressive and predatory marketing practices, the success of which have caused giants such as GE and RCA to leave the scene, and many smaller companies either to cease to exist, lose their identity or be forced to link arms with their former competitors in an attempt to survive. Then there is Memorex, but that's a whole letter's worth by itself.

Philip E. Deck

Telex Computer Products, Inc.

Tulsa, Okla.

DP Can Render Pro-Bono-Publico Services to Society

Recently I have been attacked for "unprofessional" practice [CW, Oct. 24], and for harboring "nonsensical" fears that IBM and other vendors may be having insidious influence on ACM [CW, Nov. 7], thereby harming that society.

Both attacks came from people with considerable background and knowledge. Before any possible review could be productive, a more detailed consideration of the duties of a DP professional, and to what extent our various DP rules are professional, is appropriate, and begins herewith.

One of the essential characteristics of a profession, which data processing is often claimed to be, is that the professionals give some part of their skills to perform essential public service. Thus a doctor is expected to handle, with his best available skills, medical emergencies without necessary consideration of his remuneration.

This is regarded as much more than a charitable duty, because it is thought that society demands the professions keep in position, and practice when needed by society. In many ways this repays society for the special privileges it gives doctors.

As yet no particular *pro-bono-publico* services have been asked for, or volunteered by, the computing profession. True, some unpaid services have been given, such as teaching programming in schools, providing services to the blind, etc. These, however, have mainly been in the form of charitable public relations operations, rather than fulfilling any observed need for some professional *pro-bono-publico* DP skills.

It is the function of this report to suggest there is both a public need for the *pro-bono-publico* services, and also a capability within the profession for satisfying that need.

Data processors are skilled in providing information when needed, and also in certifying that information provided is accurate. These are the capabilities we have to offer.

It should be noted these items are ones which do not *necessarily* involve major expenditures, and which are therefore suitable for the voluntary public services of individual data processors. Such services, however, can perhaps only be really effective if there is a supporting professional structure.

There are no currently defined standards as to when the public needs the presence of accurate, processed information. We can, however, define such matters on an ad-hoc basis. For instance, in the case of a suburban development being built on swamp land, it is appropriate to investigate what is going to happen in the case of heavy rainstorms. Yet, across the country as well as in my own town of Framingham, Mass., this is not being done adequately.

With or without computers, such investigations can be expensive – obtaining the necessary experts, writing the necessary programs, etc. Often they can be claimed to be sufficiently expensive, or time-consuming, that the developers or the planning boards can argue it is "economically unpractical" to provide such information to the planning boards.

Yet, because the public can be greatly impacted by a decision not to investigate – because such a decision can in fact be used to hide the substantial possibility that a problem does exist until after easy remedies are no longer available – it would be professionally appropriate to insist on such a computer simulation occurring in all cases – if such a program could be generated economically available.

Historically, professional history indicates that in order to insist on such a professional use of computers, it is necessary to reduce the costs. Doctors, before they could insist on smallpox vaccinations, had to show the cost was trivial, and that medical volunteer labor would, if necessary, be provided free.

Data processing can meet this requirement by using the unique characteristic of DP programs – i.e. the second copies of the program have practically no product cost.

In the case of the rainfall simulation, for instance, there is a program available from the Corps of Engineers which can almost certainly be used to determine whether a much more detailed simulation is needed.

If this program were in a library available to all professional societies and branches, st little or no charge, and if this library were available to planning boards, public interest groups, etc., together with some references to available sources of expertise, it could well be a basic program of a professionally maintained library.

Other possible socially valuable programs that could be held in a professional library might include, for instance, programs that would help the cities and towns start reporting their crime figures to the FBI. Many of them – even including cities the size of Hartford, Conn. – do not do so now. One of the reasons for this surprising failure (which imperils the efficiency of the national system) is the complexity of initiating an effective reporting system.

Yet this is an area where professionally checked DP programs can considerably help both by providing economy and proper performance and speeding up the time scale. Other possibilities could deal with items such as the proper measurement of the effectiveness of crime prevention programs, recidivity of released prisoners, etc.

No Great Expense Involved

Such a professional library could be set up without major expense. It could provide better and cheaper services than those available from, for instance, Nasa's Cosmic. It might indeed be able to become self-supporting.

My own recommendation is that such a library be set up by a group of DP professionals not affiliated with either the computer manufacturing nor the education-industrial complexes. Reader opinions are invited as well as suggestions for appropriate programs or offers of support.

Privacy Issue Misunderstood

(Continued from Page 8)

ment in the paper-bound payment system?

Forbes should send his researcher to Washington to talk to the regulatory bodies which have been doing their EFTS homework.

Forbes in Computerworld: "Under the check payment system, when the consumer is billed, he has the option to select the day, within certain limitations, to pay his bills. But under EFTS, payment will be simultaneous with the purchase or monthly due date. This deprives the consumer of timing bill payments with his cash flow."

I certainly wouldn't want to be a part of the EFTS Forbes describes – nor would most consumers. That is why EFTS experts don't propose such an approach to bill payment. Preauthorization of bill payments, while it has a place in EFTS, is inconsequential in terms of the overall number of transactions involved.

Limited Appeal

It is entirely optional to the customer, and has limited appeal to date.

Forbes was invited to give a speech to a users' group and he "husted his pick" on a subject of which he had little or no understanding. Unfortunately some of his "concerns" crept into CW's editorial column on the same day, and I'm sure into the minds of its readers.

What concerns me more, however, is that there are, in Washington, and in the legislatures across the country, thousands of well-meaning elected officials who will be acting on EFTS issues over the next five years with the same kind of grasp of the issue manifest in the Forbes speech.

CW can perform a useful service to its readers by confronting, from time to time, the real issues of EFTS, which Forbes and most other legislators haven't a hint of, but which are far more interesting and relevant than the old chestnuts Forbes dug up for the Digitronic Users Association.

Dale L. Reistad, a leading expert in banking systems, is president of Payment Systems Inc. in New York City.

Rep. Forbes and his staff have intensively researched the EFTS proposals, and their effect on consumers. CW plans continuing coverage. I myself disagree vehemently with almost every one of Reistad's viewpoints. Could we have reader comment? HG

Professional Practices

Turnkey Contract Guide Outlined

The practice of acquiring computerized systems by turnkey contract contains a built-in disparity between the technical skills available to the contracting parties. On one hand, there is the equipment vendor with a wealth of skills at his disposal and on the other, there's the buyer with a real need but few skills.

The following 12-point agreement framework could be a guide to a professional standard of negotiations:

- Definition of "turnkey responsibility" to be provided by the vendor, together with lists of what is and what is not the vendor's responsibility.
- Definitions, with examples, of key technical terms.
- The incorporation of proposals and other documents in the agreement.
- Provision of a system design specification, including system specifications (input, output, logic process); hardware and software specifications; performance specifications development and installation schedules; and customer facility, personnel and support requirements.
- Approval and/or acceptance procedure – to include formal approval of the system design specification; acceptance test or demonstration using realistic business data and operating volumes; an operational test showing daily performance criteria and up-time; acceptable scheduling control for testing later phases of the installation plan; acceptance of supplier responsibility for operating system and application programming defects detected after acceptance tests.
- Supplier statement regarding ownership of equipment, programming and documentation with safeguards relating to ownership changes, business failure, etc.
- Specification of equipment performance, including statement of conditions which can cause 15% degradation, covering areas of uncertainty in supplier's estimate and maximum investment needed to meet proposal contingencies.
- Specification of software performance – a statement regarding capabilities of operating system performance, specifications and limitations, and identifying those specific operating system components which can contribute to system degradation.
- Specification of upgrading capabilities defining maximum equipment and software capabilities and costs involved.
- Statement of financial obligations including safeguards, payment schedules and limitations of liabilities of both parties at point of initial contract, at approval of system design specification and at passing of acceptance tests.
- Provision of systems development and installation schedule supported by a bar chart indicating major tasks of both parties, including leadtimes, completion dates and parallel activities.
- Description of support services, including recommendations, costs for site planning, auxiliary equipment, power failure protection, file conversions and personnel training.

This framework was excerpted from data provided by J. Richard Cleming, a certified management consultant and president of System Planning Associates. Comments on alternative ways to handle turnkey contracts are invited and should be sent to Alan Taylor, Professional Practices Page, Computerworld, 797 Washington St., Newton, Mass. 02160.

SOFTWARE&SERVICES

Random Notes

System Chart Generator Is 'Autoflow II' Option

PRINCETON, N.J. – System-level flowcharts and reports useful to both the DP staff and end user are generated from existing JCL statements or from logic spelled out in the System Chart Language witb an Automated System Charter (ASC) feature now being added to Autoflow II from Applied Data Research, Inc.

Available in the second quarter of next year, ASC will produce both graphic snd tsbular analytic reports, with system chart symbols conforming to ANS standards. Tbe optional ASC capability will cost $3,740 for DOS users and $4,290 for OS installations. Monthly plans are also available, the firm said, from Route 206 Center, 08540.

Mark III Is Extended . . .

BETHESDA, Md. – GE has extended its Mark III remote-computing services to Australia and as a result, multinational companies witb operations in any of four major geographic areas – North America, Europe, Japan and Australia – can now access common data bases stored in the GE computer complex in Cleveland, Ohio.

The Australian extension of Mark III – including both time-sharing and remote-batch support – is being managed by Honeywell Pty., Ltd. and is initially available on a local call basis in the Sydney and Melbourne areas.

. . . And So Is Mark IV

CANOGA PARK, Calif. – Mark IV File Management Systems are now available from Informatics, Inc. for use under Univac DOS on the 9400 or OS-4 on 9700 mainframes. Another version, for OS-7 on the 9700 snd Series 90 CPUs, will be available early next year.

A program generation system that produces object code from detailed user specifications, Mark IV has already been implemented on IBM 360/370, Univac Series 70 and Siemans 4004 systems. Cost varies with the options desired but the new Univac-oriented versions are expected to be comparable in price to the older issues, the spokesman said, from 21050 Vanowen St., 91303.

Network Adds Plotting Support

COLUMBUS, Ohio – Subdivision plans, aerial surveys, contour line maps and other charts and graphs can be plotted with complete annotation and accuracy to 2/10,000 of an inch, based on remote transmission of data into the Compu-Serv Network, Inc. remote-computing service.

The high-speed capability utilizes a Calcomp model 748 plotter with a 48- x 82-inch drafting srea, with usable speeds up to 42 in./sec linked to the network's Decsystem-10 mainframes.

'Even IBM Couldn't Help Us'

Link-Edit Fix Eases DOS Operations

By Don Leavitt
Of the CW Staff

NEW BEDFORD, Mass. – Careful study and manipulation of the Linkage-Editor used under IBM's DOS may simplify multiprogramming operations for many users with small 360s, according to Fred Wilson, systems programmer for Acushnet Co.

The need for the study and later reworking becsme obvious when two programs written in ANS Cobol using Dbomp macros needed to be segmented because of core limitations on a 360/30 witb 64K memory and a 10K DOS 26.1 Supervisor. The Dbomp macros needed to interface witb four logic modules. The logic modules had to be included in Linkage-Editor JCL at compile/link time.

Because of the syntax of IBM Linkage-Editor job control, tbe logic modules were being associated with the last segment instead of the root phase. This linkage problem was initially resolved by obtaining an object deck from each compilation and manually sifting through to insert the INCLUDE cards for the Dbomp modules.

This worked well but added at least 20 minutes to every test shot and required the presence of the programmer to do the insertion, Wilson explained.

After exploring all alternatives with respect to the placement of INCLUDE cards in the JCL at compile time, no straightforward solution was apparent. IBM was contacted, but advised Acushnet there was no automatic way to accomplish the desired linkage correctly, according to systems support manager Raymond G. Gabler.

New Approach

After that, Wilson decided to take another approach. He saw that the Cobol root phase created several AUTOLINK and INCLUDE statements through the compiler. If a "V"-type constant could be created in the Cobol root phase, he reasoned, the Linkage-Editor would resolve it.

One of the ways to force this to happen is through the use of the CALL statement. Consequently, four CALLs were written into the source code for the root phase and coded such that they would never be executed.

On the first compile, diagnostics indicated that two of the modules, CB$CH1 and CB$BM1, had invalid phase names for the CALL. The Dbomp module object decks were recatalogued into the Core Image Library cbanging the CATLR operand names to CBSCH1 and CBSBM1.

The next compile and link test showed the four modules had in fsct been linked with entry point addresses resolved, and were in tbe root phase. Furthermore, the entry points of CBSBM1 and CBSCH1 were labeled CB$BM1 snd CB$CH1 respectively. Changing the CATLR card had no effect on the name used by the Dbomp macros in these programs and others already written.

The phase names CBSBM1 snd CBSCH1 were listed as unresolved XTERNS by the Linkage-Editor but as they are never executed, this caused no problem. The programs executed properly in the tests that followed, Wilson noted.

Both Wilson and Gsbler said they would welcome inquiries and comments about the techniques they used. Mail should be sent to them through P.O. Box E916, 02742.

HP's Single-User DOS-III to Aid Batch Processing, Programming

PALO ALTO, Calif. – Hewlett-Packard 2100 users can gain better control over their hardware and software resources, from tbe system console and through batched job entry, with DOS-III now available from tbe company.

By itself, tbe operating system is a single-user support package providing easier file handling, more flexible use of main storsge and easier operator control of the I/O peripherals. Used in conjunction with the Terminal Control System (TCS) announced a month ago [CW, Oct. 31], DOS-III puts these facilities at the disposal of multiple terminal users.

DOS-III enables tbe user to load a series of jobs interspersed with control instructions which handle the loading, execution snd distribution of results to specified I/O devices without further operator intervention. Fortran II, Fortran IV, Algol and HP assembler language programs can be intermixed in the job stream, a spokesman noted.

Within the system, the DOS-III user has the ability to disable – through programmed instructions – the memory protect feature that had limited his program to particular areas of storage. Now the program can be expanded, if required, and the user can perform direct I/O operations in tbe extended area, HP noted.

To control the size of programs, however, the new operating system slso includes a relocating program loader. Also described as a current page loader, this aids effective use of storage by limiting each program in storage to its then-sctive working set.

An extended file management package (EFMP) supports logical definitions of files and their subordinate fields within the programs. Previously, small machines have not had the system software to allow anything beyond record references that were specific to physical units and sector addresses, the HP source said.

For his part, the operator working under DOS-III now has the ability to control I/O devices from the console. Keyed-in commsnds permit, for example, the rewinding of magnetic tapes or the spacing or skipping of paper on the printer. These capabilities are, in HP's view, more useful to program development efforts than the production environment, when tbe I/O control can be under program control.

DOS-III is compatible with all HP peripherals, requires a 16K memory and costs $1,500. TCS is separately priced at $2,000.

HP is at 1501 Page Mill Road, 94304.

PDP-8 Work Controlled by ION-8

NEW YORK – DEC PDP-8 users can gain a capability for real-time multiprogramming, handling many peripheral devices and service programs operating at several different levels of priority, with the ION-8 interrupt-driven control program from Logemann Systems Associates (LSA).

ION-8 runs with interrupts enabled, allowing them to be serviced as quickly as possible, the company explained. The control program permits service programs for some devices to be permsnently resident to handle requests from those units on a "foreground" basis. Meanwhile, however, ION-8 allows "background" execution of modules in a user library of Fortran, Sabr or PAL routines under control of one or more consoles.

The sytem also supports one or more "middle-ground" levels of priority execution through first come/first served or priority scheduling of tasks at "any" priority level. ION-8 is initiated from DEC's OS-8 system snd may either replace it as tbe supervisory control program, or work concurrently with it. In the latter case OS-8 would handle editing, compilation and other peripheral operations and ION-8 would supervise program executions.

ION-8 is distributed either as a fully-customized system, tailored to the individual needs of the specific user, or as a series of source modules from which the user may assemble his own system. LSA will provide operating documentation at the system level, including source listings, source code and flow charts, and "several days" of on-site education and assistance.

ION-8 is available for $5,000 from 134 West 93rd St., 10025.

The day the new habits arrived at St.Theresa's.

It could have been the program and it could have been a faulty tape. Heaven only knows. But you'll find no peace on earth when an error is raising the devil with your orders.

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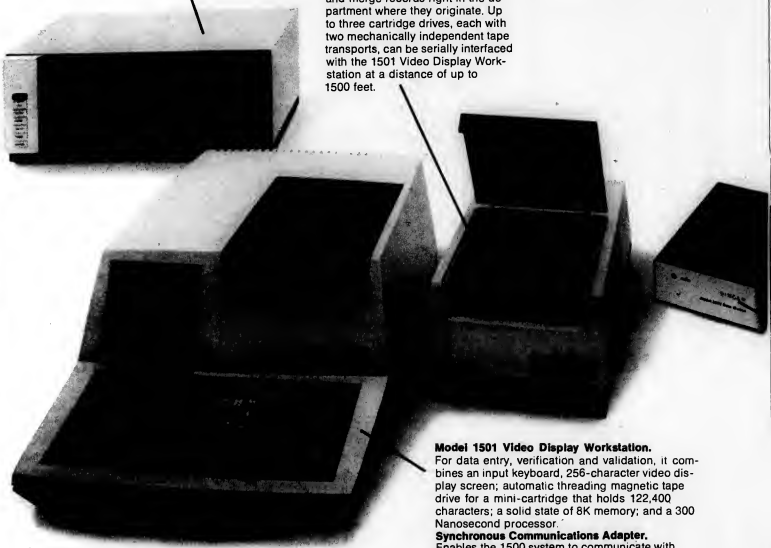
When it's BASF...you know it's not the tape that goofed.

Now there's the Singer 1500 intelligent terminal system.

Model 1511/1512 Tape Drives.
Convert and edit mini-cartridges into half-inch computer-compatible magnetic tape for communications or direct processing. The 1511 records 556 bits per inch on 7-track tape; the 1512 records 800 bits per inch on 9-track tape. Both have 7″ reels.
Also available: Model 1513/1514 Tape Drives. The 1513 records 800 bits per inch; the 1514 records 1600 bits per inch. Both are 9-track with 10½″ reels.

Model 1533 Dual Mini-Cartridge Tape Drive.
Allows you to update multiple files, store information off-line, and sort and merge records right in the department where they originate. Up to three cartridge drives, each with two mechanically independent tape transports, can be serially interfaced with the 1501 Video Display Workstation at a distance of up to 1500 feet.

Model 1525 Serial Printer.
A quiet, highly reliable serial impact printer. Extremely versatile within its price range, it prints up to 30 characters per second on either single or multi-part continuous forms. Accepts continuous journal roll paper from 7″ to 15″ widths. And continuous pin feed paper of up to six-part copies from 8½″ to 15½″ widths. Features automatic paper alarms.



Model 1501 Video Display Workstation.
For data entry, verification and validation, it combines an input keyboard, 256-character video display screen; automatic threading magnetic tape drive for a mini-cartridge that holds 122,400 characters; a solid state of 8K memory; and a 300 Nanosecond processor.
Synchronous Communications Adapter.
Enables the 1500 system to communicate with computers using IBM binary synchronous communications standards.

Now there's no better way to disperse computer power throughout your company.

Model 2024 Data Modem.
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In practice though, it's a different story. It seems like the only way to make all that new hardware and software interface with the equipment you've already got is to use a shoehorn. Or a magic wand.

That's why the new Singer* 1500 intelligent terminal system is such a hot piece of news. Because it's designed to fit right into the operation you're running now. With an absolute minimum of fuss. And expense.

And look what you've got once it's in: Besides the basic job of recording data, the 1500 gives you capabilities for verification, production statistics, self-check numbers, field totals, contents searching, table look-ups, range checking and copying.

Since the 1500 has BSC communication, along with unattended terminal operations, HASP capabilities, polling and selection, automatic error checking and recovery, expanded features and growth operations, you've got the most flexible means of getting your data processed you could ask for. At transmission rates from 600 to 9600 BAUD. The system is completely compatible with System Ten* computer by Singer, as well as the IBM 360/370.

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Touch & Know Information Systems by SINGER

Interactive Systems Cataloged By NBS Under Funding From NSF

CHICAGO – "Whether 'tis wiser to purchase or to write your own software, that is the question," parodied Dennis W. Fife, chief of the National Bureau of Standards software analysis section while addressing the recent Second Annual Conference on New Systems in Law Enforcement and Criminal Justice. He then answered his own question: "There's got to be a better way than do-it-yourself."

To prove his point, Fife described a catalog of software packages compiled by NBS under a National Science Foundation grant. The *Technical Index to Interactive Information Systems*, designed specifically to aid in the selection of these rather specialized systems, will be available by the end of the year, he said.

Selection Criteria

In addition to the technical capabilities of the systems, the index also lists some 60 factors considered useful in developing extended selection criteria. Simple screening techniques to assess user requirements and the feasibility and range of available choices are also included, Fife noted.

He cited two major technical areas users have to consider: the physical environment of the system – including hardware security and the source and availability of the software; and the processing requirements of the particular installation – including the need for support in entering, sorting, accumulating and retrieving data.

"There is quite a range of choices now available," he said. "This puts a big burden on the interactive user to decide if he should even try to write his own program. I'm not convinced that if people help develop or write a program they actually have a better understanding of its limitations and function.

"At what level are systems different?" he asked. "Only at their total application, and that includes personnel constraints and the funds available for implementation." That being the case, he concluded, systems acquired from outside and adapted to specific needs are usually more cost/effective than systems built in-house.

Rensselaer Adds to Degrees Linked to Data Processing

TROY, N.Y. – Rensselaer Polytechnic Institute (RPI) is establishing two new DP-related degree programs in computer science and systems engineering. The computer science curriculum, leading to a B.S. degree, will be offered by the mathematics department of RPI's School of Science, which already offers a graduate degree in the field.

B.S. and M.S. Offered

The systems engineering program, with both B.S. and M.S. curricula, is sponsored by the School of Engineering, an RPI spokesman said. Candidates for either the computer science or systems engineering degrees may start work in their programs in the spring term of 1974, the source added.

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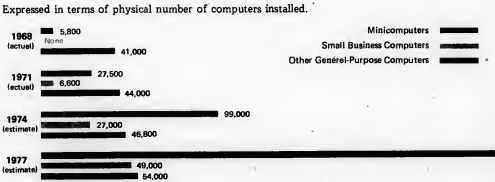
a Computerworld special report

November 28, 1973

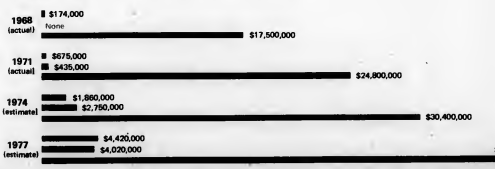
mini-com-puters

Growth of Minicomputers versus Small Business Computers and Other General-Purpose Computers:

Expressed in terms of physical number of computers installed.



Expressed in terms of dollar value of computers installed.



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Mini Buying--Pitfalls

User Must Link Probable Price To Specific Need

MAIDENHEAD, England -- "I find it staggering that, for some reason, management seems prepared to spend large amounts of time on something called 'optimal choice,' " said J.M. McNeil, manager of turnkey systems group, Logica Ltd.

"The most important starting point" in choosing a minicomputer "is for management to decide what the price is likely to be and then allot a related amount of skilled management time to its selection, stopping at the designated point. If that were done, the result of not having made quite the 'optimal' choice of machine would be negligible," McNeil said.

"Perhaps an element of pride is involved," he noted. "People like machines and they like to show them off. They would hate to put in a Varian machine and have someone come around and say they should have bought a PDP-11," he added.

Problems, Not Machines

The problem is users look at individual minicomputers as opposed to looking at individual problems. Their reality is

	Micro	Mini	Midi
Word Length (bytes)	8 to 12	12 to 16	16 to 24
Price x $2,500	<3	3 to 10	10 to 25
Example	SPC-12	PDP-8	PDP-15

Figure 1. Classes of Small Processors

forced on them by salesmen who each offer a different minicomputer.

Users would do better to isolate their problems and then determine what class of machines can solve these problems at what costs instead of choosing by cost of machines and then seeing what problems they can solve, McNeil indicated.

Instead of a generic term minicomputer, McNeil divides small systems into three classes: midro, mini and midi.

While this is a rough categorization and it is ludicrous to speak of formal boundaries, this breakdown allows users to more readily see into what price range and capabilities area their needs fall (Figure 1), he said.

"To put into perspective . . . the comparative performance of the three classes of machine, we may consider a number of roles that arise in data communications (Figure 2)," he stated.

For example, when a user is considering front-end processing, in general he is concerned with the larger classes of machine. "However, if the user were only interested in simple concentration tasks, no more than the most basic machine is

(Continued on Page S/2)

On the Inside

Mini Buying—the Proper Way

The First Step—How Do I Evaluate the Data?

MAIDENHEAD, England – The first step in buying a minicomputer system is to develop a means of converting and evaluating the abundance of information supplied by the salesmen, according to J.M. McNeil, manager of turnkey systems group, Logica Ltd.

One way to get the starting evaluation information is to set up a chart as in the example shown in Figure 3 – showing several possible minicomputers.

1	Manufacturer
2	Maintenance
3	Software
4	Memory characteristics
5	Processor characteristics
6	I/O capabilities
7	Line handling
8	Peripherals
9	Basic configuration scheme
10	Price

Figure 4. Checklist heading

For a particular application, the user can look at his diagram and see immediately that if those were the only machines available, the application may preselect the computer.

"For example, if 32K bytes of memory are needed, not every machine will provide it. If the requirement is for a large number of interrupt levels, that will preclude all the machines except one, although it is extremely slow," McNeil stated.

A basic proposition, according to McNeil, is that if users are realistic about the available products and their requirements, the actual number of minicomputers worth examining is small.

Once the user has chosen those machines that meet his needs he still has the hardest part of his selection ahead of him. The chart cuts out most of the machines but to bring it down to one final choice requires a more rigid analysis.

Factors regarding the supply and support for the system are listed at the top of Figure 4. These are the first factors to be considered when choosing a system.

The middle section consists of those items that generally constitute the technical specifications of the minicomputer. Some brochures give the impression that the minicomputer is basically only evaluated on its specifications and in particular items four and five (memory and processor characteristics).

Putting price as the last item does not mean to imply that it is the least important, McNeil warned.

But he also warned against being overly impressed with price and falling for equipment that is solely designed down to a price range instead of up to a performance level.

Suppliers

The three main factors in judging the manufacturers are place in the market, financial stability and applications experience, according to McNeil.

"First, what does the manufacturer think he is offering? Companies are different. Is he offering a kit of parts, a jigsaw puzzle the user puts together, or is he offering a product or a capability?"

It is worth distinguishing between a product and a capability, he added. "I would single out Interdata's 270X, a hardware/software package to replace the 2701, 2702 and 2703 communications equipment on an IBM System/360 as a product.

"I would cite Honeywell in the process control area as providing a capability. It is a company which has achieved a great deal in that area, with a degree of expertise that identifiably carries over to the product range in hardware and software," he said by way of illustration.

A second important factor is whether the supplier is going to be around for the life of the product. "Looking across the range of computers, I can see no attributes, no technological breakthroughs, that are sufficient to compensate for a shaky financial status," McNeil said.

In the case of application experience, most users do not know their applications as well as they think they do; if they did they would not produce such unbelievable specifications.

For this reason, the smart user will add a little in the favor of any supplier with a long experience in the user's application need.

	Mini A	Mini B	Mini C
Word size	8	8	8
Memory range	1K-12K	4K-16K	1K-8K
Store cycle	1µs	2.6µs	4µs
Add time	4µs	6µs	9-22µs
Hardware multiply/divide?	yes	no	no
Page size	256	256	32
I/O channel	8 bits	8 bits	8/9 bits
DMA?	yes	option	no
Number of addressable I/O channels	16	32	256
Interrupt levels	1	3+	1-8
Relocatable assembler?	yes	no	no
Compilers	none	none	none
Cost (4K plus TTY)	$10,175	$10,000	$10,750

Figure 3. Characteristics of three typical 8-bit machines

Likely Price Decided

(Continued from Page 5/1)

required," he stated.

While this is the type of selection process that should be taking place, in actuality, McNeil feels users start at the other end and he characterized the normal selection process:

"First, with small computers, comparatively few people know what they want.

"The client says he wishes to buy something that looks like, say, an IBM 1800. He wants the kind of support he would get with an 1800 but can only afford a PDP-8.

"He is told this is impossible and is asked for a specification; if one is lucky, one will be handed a sheet of paper which is usually a list of the attributes of a machine sold by the salesman who has made the best impression to date.

"The next stage is to make it clear that piece of paper is not a specification and, some months later, perhaps if there is not too much sales pressure of the wrong sort; something approaching a view of what the user wants will materialize," McNeil said.

"I would stress that this situation crops up in all environments, including those that are often claimed to be the most knowledgeable about the small machine, such as scientific establishments," he said.

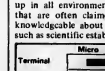


Figure 2. Role of Small Processors in Data Communications

Mini Buying – Technical Considerations

Now Check Operating Specifications

MAIDENHEAD, England – Evaluating technical specifications of proposed minicomputers is both easy and hard – information is quantifiable and comparable but it also involves the most variables, according to J.M. McNeil, manager of turnkey systems group, Logica Ltd.

After compiling a list of minicomputers that could work in the user's applications and evaluating the supplier, the user is left with a small list that should be compared on the basis of operating specifications.

Store Factors

Starting with memory, Figure 5 lists a number of items of primary importance.

Cycle time
Word length
Minimum size/increments/maximum size
Parity check
Memory protect
Read-only memory: for microprograms alternatives to read/write storage.

Figure 5. Memory Characteristics

During the last decade core memory has held its own against a number of new memory technologies, but we are now entering a new phase with commercially available semiconductor memory. Its advantage lies in high speed and low cost. The trade-off is a volatility problem: the contents are lost when the power goes down, McNeil noted.

A second grading factor for memory is the initial cost of the memory needed and the cost for memory additions.

Thus, "the danger is to buy a cheap machine with a minimum memory and find yourself paying later in memory," he added.

Read-only memory can be of importance, especially in minicomputers. "One of the fundamental problems with small machines is they are built to be cheap. Since logic costs money, small computers have a rather basic instruction set which is none too elegant," he said.

The larger instruction set is generally worth more than memory speed to the user even though users traditionally have been enamored with speed. Even in a real-time environment the importance of computer speed is exaggerated, McNeil asserted, as there are not many real-time tasks where the user would find himself directly up against the speed of any prevalent minicomputer.

Word Lengths

The fewer the bits in memory, logic, registers, etc., the cheaper the computer. However, the smaller the word, the less room for both instruction and address and the more tedious it will be to address, McNeil said.

Figure 6 shows the advantages and disadvantages of an 8-bit minicomputer.

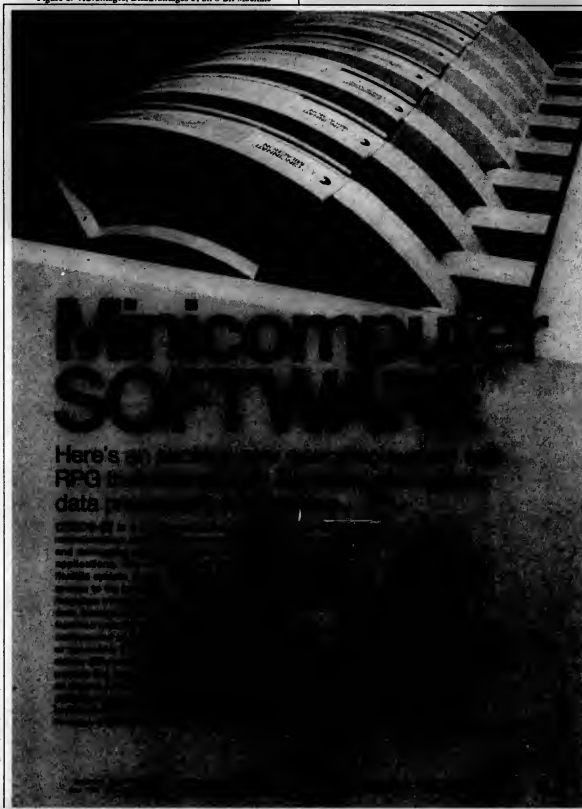
One advantage of the 8-bit machine is it is inherently attractive for data handling (although not necessarily for instructions) because it deals with information bytes. If the machine is sufficiently fast, this capability can enhance data communications applications.

Figure 7 shows what to evaluate in processor selection.

(Continued on Page 5/6)

ADVANTAGES	
	Handles information bytes efficiently; no byte-packing or unpacking
	Cheap register hardware
	Cheap store driver circuits
	Very cheap basic configurations
DISADVANTAGES	
	Relatively high cost for core increments over 4K words
	Memory address problems: either double length instructions (time penalty) or single instruction fetch but very restricted instruction repertoire
	Low accuracy for scientific computation
	8-bit input unattractive for some process control and telemetry applications
	8-bit I/O slow for peripheral transfers

Figure 6. Advantages, Disadvantages of an 8-Bit Machine



Datapoint 1100 processor based systems

Remote Batch Terminal

Intelligent Terminal

Datapoint 2200 processor based systems

Remote Job Entry

Terminal Processor

Datapoint 5500 processor based systems

Local Processor

Remote Processor

The pictures indicate a typical growth pattern of 1100-2200-5500 usage as a field office's work load increases. In the left-hand column, normal progression begins with the Datapoint 1100 for Remote Batch Terminal applications. In this mode, card readers, tape units, communication equipment, and printers are utilized as peripheral devices for efficient transmission of data between the remote location and host computer. In the second phase, the Remote Batch Terminal operation is upgraded to a 2200 to provide stand alone processing power to expedite Remote Job Entry applications. In addition to the expanded processing power of the 2200, disk capability and RPG II substantially enhance the effectiveness of the 2200 used in this way. In the third phase, a stand alone Datapoint 5500 is utilized as an independent Local Processor to meet all the dispersed processing requirements at the remote site without relying on a central host facility.

In the right-hand column, the first picture shows the Datapoint 1100 used as a powerful Intelligent Terminal for data entry and limited processing tasks. In the next phase, field office needs have grown to an intelligent multi-station requirement and are satisfied by the Datapoint 2200 used as a Terminal Processor. In this mode, a single Datapoint 2200 can provide "intelligence" for up to eight keyboard/display stations with subsequent transmission of data between the host and remote sites. The final progression is to the Datapoint 5500 Remote Processor, used in field offices as local "computer utilities," still linked to the host processor system, but now providing substantial independent compute power of their own to an array of peripherals and terminals located in the field offices.

Dispersed data processing the Datapoint way —as easy as 1100-2200-5500

Dispersed data processing the Datapoint way is the productive, economic approach to providing your field offices with the on-site computer power needed to compete in today's business world, while yet being linked to a central computing operation. Datapoint's tria of upward-compatible dispersed processors—the 1100, 2200 and 5500—offer you a capability that can be readily and painlessly augmented as office wark laad increases, as your company's communications netwark becames more sophisticated and your field office personnel more knowledgeable.

Let's look at these processors: the Datapaint 1100, available with 4K ar 8K central memory, is the new Intelligent Terminal system from Datapaint Corporation that can bring your field offices inta the on-line computer age immediately. Competitively priced, and with extensive capability for business processing tasks such as on-line (or off-line) data canversion and entry, it is a basic building block for creation of a multi-use dispersed data processing and data handling capability in your field offices. Once installed, the 1100 can do double duty for progressively mare saphisticated data processing and data communicatians assignments including remote batch applications through utilization af card reader, magnetic tape, and printer peripherals. In software, Datapoint provides a CTOS operating system, Assembly Language, and the new DATAFORM language for sophisticated data entry and editing. Initial deliveries of the 1100, with a monthly lease price af $138, will begin in January.

When your field office wark load grows beyond the capability of the 1100, it is an easy, painless transition to a more powerful Datapaint processor, without the need for jarring systems redesign and expensive software revision. The secret is in the upward compatibility of the 1100 with the well-established Datapoint 2200 Terminal Processor and the new Datapaint 5500 Remote Processor. It is as simple as pulling the plug an the 1100, plugging in the 2200. Na complex systems changeaver, no costly saftware rewriting is entailed: the user obtains the needed increment in dispersed data processing pawer in his field offices without disruption. The 2200, a widely used and well-established system with up to 16K central memary and dual ECMA standard cassette drives, will do everything the 1100 will da, and also provide an expanded on-site camputer pawer. In a multi-station made, it can service up ta eight law-cost terminals for data entry and related tasks.

The 2200 is a natural step towards the 64K Datapoint 5500 Processar (deliveries in third quarter, 1974), which will do everything the 2200 does and also constitutes an on-site "camputer utility" in your field offices. This system will provide computer pawer far a large number af associated peripherals and for a variety af law-cost, nan-programmable terminals while simultaneously furnishing a high speed link to a central computer facility. These three Datapoint communications-oriented dispersed processors, progressively larger, faster and more pawerful, open a new world of capability to the network-oriented user who sees the need far a growing satellite computing capability in his field affices, while still accessing a central computer facility for heavy duty processing and primary file storage.

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'Everything They Want, When They Want It'

Small User Switches to In-House, Has Room to Grow

By Don Leavitt
Of the CW Staff

INDIANAPOLIS, Ind. – "A company our size shouldn't be spending more than $800/mo for data processing. There was nothing available, until this kind of configuration, that would allow us to do our work for that kind of money," systems analyst Benton Chudnov said recently, explaining why Melvin Simon and Associates, Inc. chose a mini-based, commercially oriented system a year ago.

Before it acquired its DEC Datasystem 330 last November, the company – which develops and manages shopping centers – had been renting time "outside" on an IBM 1130, to run a customized accounting system, and more time on an IBM System/3 for other applications. It had no DP equipment in-house.

On-Site Needs

With the "very rapid expansion" of Melvin Simon's operations, however, it was becoming increasingly inconvenient and expensive to continue with that sort of arrangement, Chudnov said. The company needed a facility on-site so that using departments could get "everything they wanted out of it, when they wanted it," he went on.

The system installed, in the middle of the DEC Datasystem 300 line, included a single disk, two DEC tape units, a Centronics-built printer and DEC's Commercial Operating System software. This configuration gave Chudnov the speed of the disk, which he particularly wanted for on-line data entry, and the backup support of tape, so crucial to any commercial application.

Continue 'Outside' Work

With the changeover to the in-house gear, the company was able to continue doing all it had done "outside" and add "sub-

(Continued on Page 5/7)

Compare Operating Specifications

(Continued from Page 5/3)

McNeil advises users to pay particular heed to the cost of options as some suppliers, in an effort to keep design costs down, offer a bare-bones machine that must be augmented with these so-called options.

Number of programmable registers
Number of index registers
Instruction word length(s)
Instruction set:
  Is it byte-oriented?
  What is its power? Length of list?
  Is not necessarily a guide?
Hardware multiply/divide?
Modes of addressing:
  DIR, ISL, INC, IMM, PAR, INR
Automatic power fail/restart
Real-time clock(s)
Cost of optional facilities

Figure 7. Processor Characteristics.

I/O characteristics can be crucial in most minicomputer applications especially those dealing in real-time operations (Figure 8).

Users should certainly look at the interrupt structure and understand the terms: single level, search ring and matrix control, McNeil advised.

With single-level structure, the user is concerned with a number of interrupt paths all handled on a precisely equal basis. At any one time the processor will service the first interrupt to occur; all others will be locked out while this service is completed. Thus, devices must wait for attention if they find the I/O bus busy.

The search ring brings the user a little nearer to a priority approach in interrupt handling.

DMA
Interrupt structure:
  SL, SR or MC
Arm/disarm
Number of external interrupts
Identification of external interrupts
Priority levels
Response times

Figure 8. I/O Characteristics

McNeil stated. While an interrupt is being serviced, all others are locked out, but on completion of that service, the processor will give priority to the next interrupt according to a preset order.

With matrix control, the process will discontinue servicing an interrupt if an interrupt of higher priority occurs.

An important point, McNeil said, is whether at the time of an interrupt the processor is automatically aware what has caused that interrupt. Commonly, most minicomputers with single-level architecture merely present the system with the knowledge that an interrupt has occured. It is then necessary to execute a query sequence to determine which device is being serviced, McNeil said.

A full copy of McNeil's advice on buying a minicomputer with his evaluation of various minis is available in Infotech Informa-tion Ltd.'s State of the Art Report 13 "Minicomputers." Infotech is located at Nicholson Howe, High St., Maidenhead, Berkshire, England.

'Ephemeris' and All That

LOS ANGELES – In space vehicles the mini can provide both the power and size needed for control and other operations. And in some applications there are no apparent alternatives.

As Nasa's Mariner '73 unmanned spacecraft travels its 260-million mile journey to rendezvous with Venus and Mercury, it has room for only a two-ft-square minicomputer to keep it on the right path.

The Lockheed MAC minicomputer and a 210-ft radar antenna work in cooperation to overcome tracking problems caused by the doppler effect.

Over the great distances between Earth, Venus and Mercury the relative motion of the planets distorts the interpretation of radar signals by an apparent change in frequency. The minicomputer's job is to predict the change of incoming frequency and tune the receiver to the right frequency.

To function in this manner, the mini solves an equation with the unlikely name of "ephemeris polynomial," which predicts the location of the planets from known data.

User Goes In-House With Room to Grow

(Continued from Page 5/6)

stantially" to the workload it handled. The computing power that the system provided, at its price, "so far surpassed everything else on the market that it really was the only choice," the analyst went on.

The Dibol language processor provided with the Commercial Operating System is close enough to Cobol to be used comfortably by Chudnov, who has had 12 years' experience in DP, and by two people who have joined him since the system was installed but who had no previous programming background.

"There's little they can't do. They're writing programs for our on-line systems comparable to logic it would take a 360 programmer well over a year to attempt."

Accounting Needs

Melvin Simon attacked its accounting information needs first. A general ledger system is already up and running and Chudnov and his crew are now completing a full financial statement and reporting system. An on-line data entry system will be expanded next year into what would loosely be identified as "receivables" in other installations, the analyst said. Work on a payroll system is to start shortly, he added.

The on-line data entry operation always has been considered a key to the entire system and it has already justified itself "many times over," in Chudnov's view.

"On-line" may be a somewhat misleading description of the system; it does not involve any communications from remote sites, but it does support direct data entry from CRT terminals, on an interactive basis.

The system is designed so that the CPU does "every bit of checking it can do" and the results have been very satisfying thus far. The system is processing some 2,500 transactions each month, and is coming up with only four or five errors that somehow slip through the editing procedures.

The system is built around the concept that the operator should not be able to go on to the next field until the data for the current field has been positively checked. Debits and credits must balance and any out-of-balance situation forces a complete re-entry of the item.

Room to Grow

While he has system development well under way, Chudnov feels his system also provides plenty of room for growth. The system includes background/foreground support so that on-line functions can be handled concurrently with batch work, and multi-terminal support – due shortly, according to Chudnov – will allow several terminals to access files directly.

The printer can be improved in speed if that seems necessary, and up to eight disks can be put on the system if storage needs grow, he noted. Though the company went through a "typical hardware shakedown" for the first couple of months, conversion to the DEC system was very smooth. "Relative to all the problems I've seen" in other situations, Chudnov said, "we've had none." The biggest problem he's had has been maintaining supplies as the company has grown.

Support from DEC has been "great," even though – according to Chudnov – the local DEC service force had to learn about the Datasystem from the Melvin Simon configuration since it was one of the first in this state. At first, the DEC people didn't really recognize the needs of a commercial installation, since they were used to time-sharing users and several newspapers in the area.

Chudnov knew there was no backlog of application programs for the system and he says now he had to convince DEC that his proposed installation could be self-sufficient. In fact, however, there is a "hot line" back to DEC's Maynard, Mass., headquarters, and, now at least, various software experts here.

With the Datasystem, Chudnov concluded, DEC has provided a great opportunity for a system without many preconceived restrictions, but something that will work for the user willing to put some effort into it.

About the Author

This special report was prepared by Michael Weinstein, *Computerworld's* Systems Editor.

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Firms With Regional Offices Fare Best With Remote Minis

TORONTO, Ont. – Remote minicomputers can give firms with regional offices substantial cost savings and greater efficiency compared with a centrally located large computer, according to J. B. Burke, vice-president, finance, Bristol-Myers Products Canada Ltd.

Applications such as the one at Bristol-Myers illustrate the minicomputer's ability to serve users as a dedicated portion of a larger system.

"Even though we could have realized processing savings through a central computer, processing of data at regional offices more than paid for itself through the elimination of the costs and delays inherent in moving data to and from the central processing point," Burke stated.

Bristol-Myers has nine plants located across Canada with central headquarters located here in Toronto. Prior to using the minis, "we were operating a management information services department here using an IBM 360/30 with 64K bytes of core memory. This system has traditionally operated in a batch mode," Burke said.

In addition to the company headquarter's batch operations, the Toronto computer handled all invoicing functions from outlying areas.

Shipping documents were received from regional plants and product codes were entered onto the documents. Reference was made to a master product book which lists the shipping weight and a total shipping weight for the order was entered.

"Prior to the use of mini systems in these outlying areas we had been facing problems with this procedure, including delays in receipt of information. These delays averaged six days per plant and sometimes went as high as ten days," Burke noted.

About a year ago, he stated, his firm began to look at this problem with the view of speeding up the receipt of information in Toronto.

"As a first step, we looked at the traditional RJE [remote-job entry]. However, this presented some serious problems – mostly economical – in that operating with dumb terminals would have required them to be on-line with the main computer to do any processing. In addition," he said, "we would have had to increase our core to provide the necessary CPU power."

Rejecting RJE, the firm set out to find some sort of device allowing data entry at a regional center. Instead of going on-line as required with RJE, the idea was to find a system on which information could be accumulated locally for transmission to the central computer once or twice a day.

"For this plan, we needed some local means of input and retention, some type of transmission facilities and some type of local printing," he said.

Among the proposals considered was the Datapoint 2200, made by Data Point Corp. of San Antonio, Texas.

"At the time we investigated this piece of equipment we found a configuration consisting of one CPU with 12K bytes of memory, one disk with 2.5M bytes of storage, and a 30 char./sec printer," Burke stated.

This equipment rented for $820/mo and had the ability to communicate directly through normal communications channels with a conventional central processor, he added.

The firm's first step was to use the mini system to load the disk with the customer code number and a series of product codes. Once the entire day's business had been entered, it was the intention to transmit this volume in bulk to the central computer.

"In effect we were using the minicomputer as an information accumulating device and as a printer," Burke said.

At this stage, the firm had solved most of the delay problems: information shipment was cut to one day resulting in cutting the credit control and cash flow problems to one day.

Getting More

The next step was to update sales and inventory data in Toronto and, by selection from main disk files, transmit up-to-the-minute information back to the regions.

"It was during this stage of development that we realized the disk capability of the local office would permit us to maintain all this needed information locally with no need to go to the central computer.

"Even though we could have realized processing savings through a central computer, processing of data at regional offices more than paid for itself through the elimination of the costs and delays inherent in moving data to and from the central processing point." – J.B. Burke

Burke said.

The new concept was to use the local minis as totally autonomous systems with the local computer having full information on local stocks, customers and prices. Orders would be entered directly via a video terminal which would do all processing to produce the required documents.

At the document is being prepared, a picture image is placed on the disk subsystem attached to the mini. At night the mini is polled from the central office 360/30 and the priced sales data is entered into the main CPU for production of consolidated records.

An example of the cooperation between the minis and the 360/30 is in the area of credit control.

"We establish an algorithm to define each customer's credit control availability. Obviously if a customer has a limit of $50,000, the fact that he bought $40,000 yesterday should not impede a shipment today. On the other hand, if he bought $40,000 worth of goods six months ago and has not paid, then shipment should not take place. If the customer is in an overdue position when we poll the local minicomputer at night, a mark is placed next to that customer's record," Burke said.

This mark later prohibits the creation of shipping documents for that customer.

Power to the People

Mini Has Ability to Move Away From Remote Batch

TORONTO, Ont. – One of the greatest promises of the minicomputer is its ability to move computing away from large remote-batch computers and back into the hands of the people the computer is supposed to assist, according to M.J. Lucas of L & W Data Systems here.

Lucas outlined a tragic history of the computer trying to solve an initial problem with a solution that created more problems than the old system.

"In its precomputer life, a well-run business could generally maintain an effective on-line information system using clerical staff. Essentially these people posted transactions by hand in ledgers and responded to management's information needs on an "as required" basis.

"These processes were known to be slow, inaccurate and inefficient and became more so as companies expanded in volume, functions and locations," Lucas said.

At this point, he noted, the computer industry entered the scene with batch processing systems which were so powerful (according to their advertising) they would answer everybody's prayer for salvation from the information bind.

"In many cases these systems not only failed to solve the problem but, in fact, increased overhead and introduced such things as sorts, file dumps, punched cards, little squares on forms which must be filled in by the uninitiated for the convenience of the keypunch operator, sequential processing and more paper than the user could read, leave alone understand," he asserted.

The difficulty, according to Lucas, is the fact that the computer industry offered a data processing solution instead of an information solution. "Management is asking for information pertinent to its day-to-day problems but it is presented with a paper factory."

To solve the central mind-boggling concentration of data, users must find some means to make selected data available at the office or plant where the data is pertinent. Not only is this logical, it is technically possible and even cheap using minicomputers. Yet despite this fact, users have traditionally moved toward more powerful data processing systems instead of toward multiaccess information systems, Lucas said.

"Right now the present development of minicomputers and associated peripherals makes on-line multiaccess information systems economical and viable.

"The mini can support a large number of terminals; it can support disk storage of the size needed to handle required throughput volume; it is physically rugged so it requires little site preparation; it is reliable; and last but not least it is inexpensive," he added.

The existence of a large assortment of peripheral devices means the user can specify mini system configuration from remote site to remote site. Yet despite system variance, the central processor and disk make-up can remain constant so data entered at one site can be readily read and edited at another.

A secondary advantage of the mini approach is it gets users away from the programmer syndrome, Lucas feels.

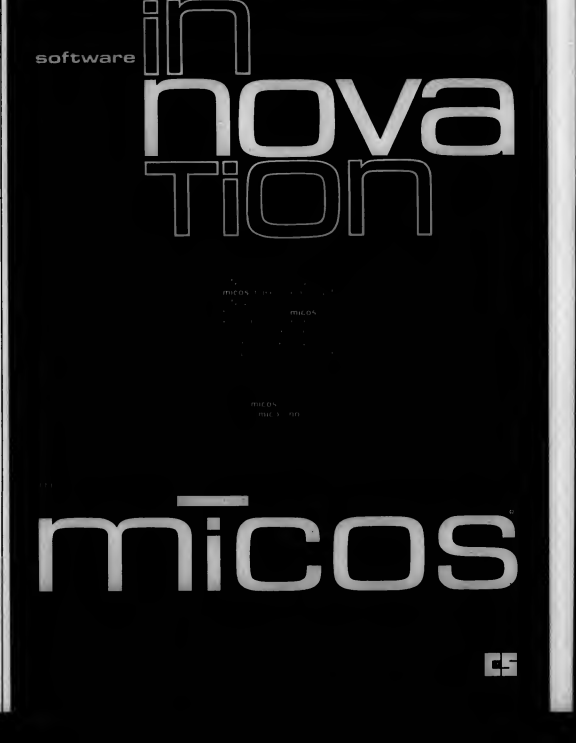
"We have found it is easier to predict a user's throughput than a programmer's throughput volume during system development. Because the mini is smaller and is generally bought to perform a defined function – as opposed to the nebulous function called data processing – it is set up and judged on the performance of that function," he asserted.

The interface between the user at a remote site and the minicomputer is direct, while the interface between the large computer and the user is through programmers, analysts, operators, keypunchers, etc., he noted.

But this immediacy of contact also creates a problem. "Traditionally mini systems are not supplied with on-line business-oriented software systems. This part of the industry has not been around long enough to develop the required systems," Lucas said.

The remote office user is not a "computer heavy"; he requires a simple direct operation and the system must be transparent.

However, this problem is evaporating through a realization by both the minicomputer builders and outside software houses that this need is there and a strong move is going to be made in the next few years away from one large central mainframe to small remote functioning systems.



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	Parity	no	no	yes	yes	yes	yes
Chassis	5 Slot	x	x	x	x		
	10 Slot	x	x	x	x	x	x
	17 Slot	x	x	x	x	x	x
Features	Battery Backup		x		x		x
	Automatic Prog. Load		x		x		x
	Direct Mem. Access		x		x		x
	Integer MUL/DIV		x		x		x
	Extended Direct Addressing				x		x
	Microverification				x		x
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DP Center Provides Vital Data for Four Communities

WESTFORD, Mass. – Educators, school and town administrators, and state correctional institutions are banding together around a minicomputer here to solve common and unique needs.

For the educators, the mini means better education directed to the individual student; for the administrators, access to immediate processing of records and forms; and for the inmates, a better chance at jobs and rehabilitation.

All of these benefits have come from a small system originally intended only as a teaching aid, according to Joseph Danahy, DP manager of Nashoba Valley Technical High School (Nashoba Tech) here, which houses the shared data processing facilities.

Prior to obtaining the minicomputer, schools in the Nashoba Valley were faced with several educational problems.

The schools wanted to introduce computers as a tool for teaching basic problem-solving techniques but none of the schools could afford its own system. The alternative of time-sharing service bureaus was discarded because hourly rates were too expensive. In fact, charges for most services' hourly telephone connect time was in itself too high, Danahy said.

Parallel to the school's problems, local administrators saw their monthly data processing costs increasing rapidly as they added new services and personnel.

The Nashoba Valley towns of Westford, Groton, Littleton and Chelmsford first cooperated by building the technical high school to serve the vocational educational needs of the four communities. This centralized role led naturally to the vocational school becoming the hub of community data processing housing the HP 2000 minicomputer system and an IBM 1130.

The HP system performs the time-sharing service operations while the IBM 1130 handles batch administrative work.

From this central location, low-cost lines fan out to city offices and other high schools. Twelve video display terminals and four standard teleprinter (TTY) terminals are located at the central location.

The video display terminals are all located in one room and are used on a rotating basis. The four TTY terminals are placed at different locations around the school for general problem-solving and as learning devices in data processing courses.

Originally, the system consisted of the central unit with 16 terminals obtained through federal and state grants. A recent modification allows 32 terminals to access the computer simultaneously, Danahy said.

Terminals are also located at three of the state's correctional institutions – Concord, Norfolk and Walpole. From these terminals inmates run many of the same programs as the Nashoba Valley students. Included are CAI exercises to improve basic skills and specialized programs to learn vocational skills. In this manner, many inmates are gaining skills needed for high school diplomas and preparing themselves for gainful employment, Danahy noted.

At present, much of the towns' administrative work is being done in a batch mode on the IBM mainframe, but with the success of the more accessible HP 2000 system, plans are underway to put common data needed by all four towns onto the minicomputer. The data would then be accessed from remote terminals cutting duplication of storage and processing costs.

Improve Basic Skills

CAI remains the largest and most valuable application on the HP 2000. Students who are weak in basic skills receive individual instruction in special remedial classes.

A special Instructional Dialog Facility (IDF) allows teachers to develop CAI-type programs depending on individual needs. Using IDF, teachers in several vocational areas are dividing subjects into Individual Learning Application Packages (Laps) for specific tasks.

These learning packages are then run by students who can progress at their own pace.

Several terminals are located in the data processing department of Nashoba Tech. Here the students learn how to run the computer and other data processing equipment. This training is meant to lead to careers starting as keypunch operators, coding specialists, junior programmers, computer operators and data processing librarians.

The system is particularly useful to the students "because it is so easy to learn," according to Elwood Bent, data processing instructor.

The Basic language – native to the HP 2000 – can be learned in a few hours yet is useful for both simple and sophisticated programs, he added.

In addition to a day school program, the computer finds work during a full night-time schedule. Adults use the data processing equipment to either add to their general knowledge of computers or direct their efforts toward a specific computer position.

Not only is the computer used to train students for data processing positions, but a guidance program also helps them plan for higher education or find jobs.

One program can show at a glance tuition costs, degrees offered, departments and college scores needed for entrance to universities.

A second set of programs shows the same type of information for vocational schools and two-year colleges together with scholarship information.

For those seeking immediate jobs, a program is available to show specific career information describing job opportunities, education required, typical pay and other information.

Future Plans

In addition to the expansion of the administrative and LAP programs, the school plans on expanding the impact of its computer services through Project Model (Mobile Occupational Development Educational Laboratories).

This project will bring educational laboratories to the educationally and culturally disadvantaged, as well as physically and mentally handicapped children and adults throughout the area. The mobile labs will each contain a terminal so remote student populations can benefit from the same programs offered schools and administrators in the Nashoba network, Danahy said.

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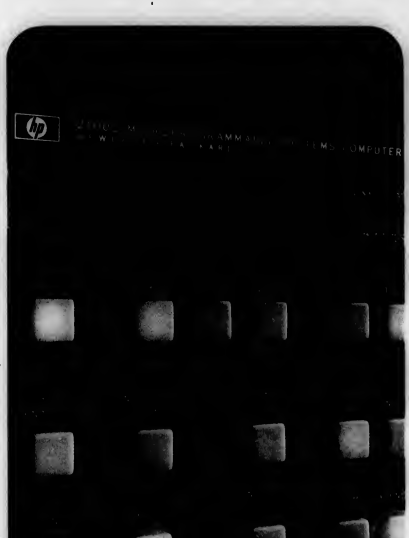

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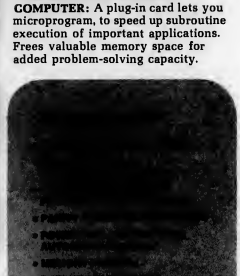

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Minicomputer's Hardware Cost Decreases So Software and Capabilities Increase

"Once a system is budgeted this cost has a tendency to remain constant."

The minicomputer is irreversibly moving toward the end user. This move has nothing to do with any marketing plan or change in minicomputer philosophy, according to Gordon Bell, vice-president, engineering, Digital Equipment Corp. "The move to the end user is a logical and natural evolution that becomes clear once users see where the mini has been."

A key factor in this move is the downward cost of minicomputer systems. As the systems get cheaper they reach a point where one group of users with a specific problem is willing to pay the current price for a solution tool (the minicomputer), Bell said.

For example, he stated, in 1963 a fairly comprehensive minicomputer system cost around $27,000. In 1973, this cost dropped to around $2,000 for an equivalent system.

This drop in hardware costs turns out to be a fairly constant 35% per year, which seems to be a good estimate for the next few years at least, he predicted.

Following this downward slope, at some point the price of a mini system is going to be attractive enough to a given group of users.

For example, at some point in time the cost will drop to the point where a very small user with say a hot dog stand will find the mini cost-effectiveness enough to incorporate into his business, Bell said.

But before a "hot dog stand" mini becomes a reality the cost of the hardware must drop still further because of the increasing costs of adding software to make the mini a solution tool and not just iron.

Yet the cost of hardware is dropping faster than software and other support is rising, so the end result is a drop in system costs.

The Constant Price System

When a minicomputer system reaches the point of acceptability in a given end-user situation, a strange thing happens, according to Bell. "Despite future reductions in system building costs, that particular application system's price remains constant over time."

Using the "hot dog stand" user as a continuing example, Bell hypothesized a system for this user would become attractive at $1,000. "Let us say we are able to build and support this system by 1975 complete with software and support. At this point the need and the solution will come together and the system will be built. A new class of businessmen will become computer end users.

"But let us also look into the future to 1978 when we are able to build a comprehensive system capable of supporting the hot dog application for $500; the hot dog stand user will still be paying $1,000 for a new system."

Instead of giving the user cheaper systems as time goes by, he is given systems with more software and other capabilities.

In one part this is purely psychological, Bell said, as once the user is used to paying a given amount for a system, he expects to pay that figure. More pressure is put on the system supplier to offer more capabilities – as opposed to dropping price.

"I suppose it has to do with the nature of budgets; once a system is budgeted this cost has a tendency to remain constant. If a user feels $1,000 is justified to solve a given problem this year, then $1,000 is enough a few years down the road, especially if the latter system has many more features," Bell said.

Danger in the Evolution

There is one major danger to the user in this dropping price picture that is directly tied to overly ambitious expectations, Bell said.

The pressures of competition both among users and builders presents the temptation to build a system for a specific need in advance of the right technology/cost ratio.

"To jump immediately in with a new system (to become a first experimental user) runs the risk of getting a system before its time. The future for such a user may involve getting a system that will have to be redesigned at a later date or getting a system that incorporates compromises made in the name of getting the system there first," he warned.

Monitors for Smoke, Intruders

Mini Makes Sure the Homes Are Secure

HOUSTON – As computers become more a part of consumer life, many people's introduction to the hardware/software world will be the minicomputer.

Residents of Sugar Creek, a $200 million community here, will have direct contact with DP through an around-the-clock

A security guard is informed by the computer system based around Nova 1210s if any intrusion or fire occurs in any monitored Sugar Creek home.

home security service based on two minis.

Through sensing devices installed in the homes, the minicomputers automatically check for intrusion, monitor for fire and smoke and help dispatch assistance to a home if there is an emergency.

Family Enters Code

Each homeowner accesses the system by using a 9-key keyboard that looks like a Touch-Tone pad on a telephone. To initiate the security system, a Sugar Creek family enters a code that identifies the home to the Data General Nova 1210s.

After the system is activated, checkpoints throughout the house are continously scanned and their status reported to the system.

If any of the doors or windows are opened, the computer immediately turns on the lights in the house and sounds an audible alarm. A typed message is printed in the security center that tells o security guard where the intrusion occurred.

From this message, he can either dispatch a roving patrol to investigate, or in the case of fire alert the local fire department.

Initial cost to Sugar Creek families for the minicomputer security system comes to about two percent of the cost of the homes which ranges from $50,000 to $200,000.

Like Phone Bill

Monthly operating costs are comparable to a typical telephone bill, according to Robert Taylor, the system designer.

Future applications for the Nova-based system include reading utility meters, providing a common data base of useful community information and a community-wide paging and locating system.

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Writable Control Store -- Few Users Fully Understand Its Powerful Potential

By Fred Coury
Special to Computerworld

Writable Control Store (WCS) represents a significant step forward in minicomputer technology. However, many users do not fully understand what it is, what it does and most important, what it means to them.

To understand WCS and its implications, it's necessary to understand microprogramming, another concept that is often misunderstood and therefore not used to its full potential.

The block diagram of a digital computer is shown in Figure 1. Generally speaking, the lower three blocks (program and data store, arithmetic/logic unit and input/output section) are rather straightforward, regular in structure and similar in most computers.

The sequence of operations to be performed by the minicomputer is determined by the user's program, which resides in the program and data store. The control section reads the user's software instructions and directs the appropriate hardware to execute each instruction.

The logic of the conventional control section, unlike other blocks in the figure, is usually random in nature, with specific hardware dedicated to each function. This usually means a unique design for each different computer.

In the microprogrammed minicomputer, the structure of the control unit is made regular by separating the functions to be performed by the control unit from the sequence in which functions are to be performed. The functions are specified by control lines which go to various points in the memory control, arithmetic/logic unit and I/O section.

However, the sequencing of control functions is defined by a sequence of bit patterns, or microinstructions, from the control store which is part of the control section (Figure 2). The sequence of microinstructions is called a microprogram and is often referred to as firmware because it lies somewhere between hardware and software in organization and permanence.

Implications for the User

This is all fine if you are a minicomputer designer. But what does microprogramming mean to the user?

First, it means higher performance at lower cost. For example, extended arithmetic instructions can be standard features as they require no additional hardware, just some additional microinstructions in the same control store area as the standard instruction set.

Second, it means higher speed. This is a function of two things: one, the ratio of the speed of the control store to the program store, and two, the relative power of the microinstructions versus the user instructions.

It is not uncommon for the control store, where microinstructions reside, to cycle several times faster than the program store, where software instructions reside. Also, microinstructions are generally longer (bit width) than the standard 16 bits common to most minicomputers. The longer instruction width and faster control store cycle time multiply the speed with which microinstructions are performed compared to corresponding software subroutines.

The payoff is simply that programs run faster. One in-house network optimization program was speeding about 95% of its time in floating-point subroutines (Figure 3). Substitution of floating-point firmware sped up the execution of floating-point instructions by a factor of almost 20 and reduced overall program execution by a factor of five.

Another major advantage to users of microprocessor-driven minicomputers comes from the flexibility of the instruction set. Since the user instruction set is defined by firmware routines, new instructions can usually be added merely by extending the microcode.

The two extremes of flexibility are the non-microprogrammed minicomputers which have a rigid and fixed instruction set hardwired into the machine, and general-purpose emulators – machines that can be made to emulate any other but have no identity of their own.

There is a trade-off for more flexibility in that supportability is inversely proportional to flexibility. The more undefined a minicomputer is, the harder it is to support it with software and peripherals. A means of getting around this hassle is to incorporate the microprogrammed mini with a standard set of instructions to provide the structure and allow the user to write his own additional microprograms for his unique applications.

Again what does this mean to the user? How does he actually go about adding new instructions and, in view of the fact that the probability of having a program run perfectly the first time is extremely slim, how does the user debug his microprogram?

That's where the WCS comes in. Although Figure 2 shows the control store as a read-only memory (ROM), the program had to be written into it somehow. In more classical implementations this is done by hand or by machine.

However, there is nothing to prevent data from being written into the control store automatically by the minicomputer which it controls.

This concept is illustrated in Figure 4 where the WCS looks like an output device – the computer sends data to it. To the control unit, however, WCS is indistinguishable from the basic instruction set contained in the factory-implemented ROM.

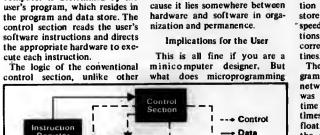


Figure 1. Generalized Block Diagram of a Digital Computer

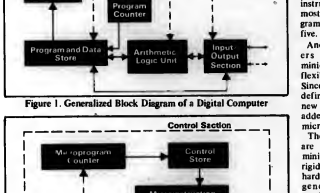


Figure 2. Microprogrammed control section has its own instruction set and its own memory (control store), which is typically much faster than the main computer memory (program and data store).

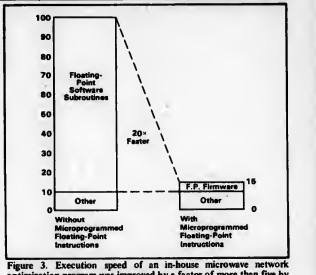


Figure 3. Execution speed of an in-house microwave network optimization program was improved by a factor of more than five by implementing floating-point subroutines in firmware.

The user can thus generate and develop added instructions to fit his own unique needs.

There are three principal applications of WCS. The first is to test and debug microprograms before they are committed to more permanent storage media.

The second application is in systems which dynamically alter the computer's instruction set to optimize the tasks they are called on to perform.

For example, a disk operating system might load a compiler into the program store, then load a set of compiler-oriented microprogrammed-defined instructions into the control store. This allows the compiler to execute very efficiently.

When the resulting object program is loaded into the program store for execution, the control store is reloaded with a set of appropriate macros.

A third basic application is in the area of education, particularly in computer systems design.

Fred Coury is minicomputer section manager at Hewlett-Packard Data Products Group.

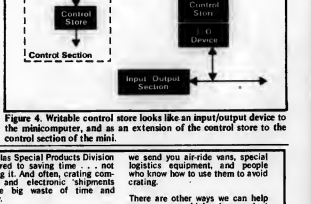


Figure 4. Writable control store looks like an input/output device to the minicomputer, and as an extension of the control store to the control section of the mini.

Texas Instruments announces for the 980A minicomputer interactive terminal processing

DX980 is a general purpose operating system that supports the 980A computer in various applications including batch processing, interactive terminal processing, and real-time processing. It can support all of these applications simultaneously or each one individually.

The Memory Protect/Privileged Instruction feature of the 980A provides a "hardware protected" environment so that an executing program cannot destroy the operating system or another job.

DX980 features a modular organization. Executive functions common to several application environments are included in the nucleus, while executive functions unique to specific environments are embodied in subsystems.

The nucleus is partially memory resident and partially disc resident with the disc resident portions called into memory as required using a dynamic allocation technique. The nucleus provides for such functions as:

Job Management – to provide the facilities for job submission, resource allocation, job initiation, execution management, and job termination. The number of jobs active is limited only by available resources.

Task Management – for task creation, scheduling, synchronization, and termination. Multi/tasking is supported both across several programs and within a single program.

Memory Management – for dynamic memory allocation and release.

I/O Management – to provide I/O functions from programs to peripherals on a device independent basis.

File Management – to provide a device independent interface from a program to data stored on disc. Three file types are supported:

Linked Sequential File – has an access interface identical to that used for the various sequential devices (magnetic tape, line printer, card reader, etc.). Consistency between sequential device and disc is achieved with the Linked Sequential File.

Relative Record File – provides a low overhead direct disc access to a contiguous section where I/O transfers may be either blocked or unblocked.

Indexed File – provides a directory-supported random access method based on a record identifier whose size is user specified. File operations include record addition, insertion, modification, deletion, and retrieval using either a random or sequential access method. A multiway balanced tree directory provides random access with extremely low disc access for search.

Operator Communications – provides an extensive command language that may be used from the system operator's console. Subsystems are individually activated and deactivated by the systems operator as needed. When active, a subsystem operates in privileged mode and is essentially part of the operating system. Main memory is allocated to the subsystem only when it is active so a user who is not interested in a particular operating environment does not pay a penalty for the ability of DX980 to support the environment.

Multi-terminal 980A System

Batch Processing

A batch processing environment is supported by three separate modules, referred to collectively as the Batch Processing Subsystem:

Batch Input Reader – is used to effect direct assignment of a sequential input device to a sequence of serially executed programs.

Batch Input Spooler – is used to effect spooled input from a sequential input device to a sequence of programs

*Trademarks of Texas Instruments Incorporated.

DX980—an operating system that supports batch processing, and real-time...simultaneously.

which may execute in parallel.
Batch Output Spooler – is used to effect spooled output to a sequential output device.

Interactive Terminal Processing

DX980 provides for interactive communication between the system and local or remote terminals through the Interactive Terminal Subsystem. The features provided include:

- An interface to support multi-user interactive applications programs
- Interactive file editing
- Remote job entry
- Job status retrieval

Real-Time Processing

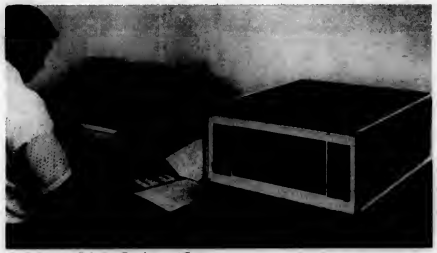
DX980 provides for multi/tasking on a priority scheduling basis. The processor may be switched from task to task by an I/O request, a supervisor call, a device interrupt or at the end of a task. It provides a roll-out/roll-in feature to insure real-time response to high priority requests.

Other Software

DX980 supports a variety of software including FORTRAN IV, symbolic assemblers, the TI language translator and the linkage editor.

It will operate on any 980A system with at least 16K memory, an interval timer, an operator's console and a disc. The modular structure allows expansion to include:

- Multiple 3330 type disc drives
- Multiple disc cartridge drives
- Magnetic tape drives
- *Silent 700** ASR or KSR data terminals
- Card readers
- Line printers
- Alphanumeric CRT terminals
- Paper tape readers and/or punches



Low-cost 980A Software Development System

- Communications interfaces
- Hardware vectored interrupts
- Up to 64K words main memory

DX980 allows users with big jobs to do their processing in an economical manner. However, Texas Instruments also offers software to support the many users who do not need a large disc-based system to solve their problems. For this class of user TI offers the Program Development System shown above. This system may be as simple as a $9725 package of an 8K 980A with a twin cassette *Silent 700* ASR terminal. It enables fast and easy development of new software. Speed, simplicity, and reduced noise level are the major advantages over a system equipped with a 33 ASR.

Standard software includes:

- Loader
- I/O support package
- Assembler
- Linkage editor
- Source editor
- Debug aids
- A wide variety of additional peripherals, plus expansion capabilities to support FORTRAN

Hardware

This software has been designed to take advantage of the powerful features of the 980A, which include:

- Hardware multiply/divide
- Memory parity
- Memory protect
- Privileged instructions
- Power fail interrupt
- ROM bootstrap loader
- Removable control panel with keylock
- Hardware breakpoint and program sense switches
- DMA interface port, expandable to 8 ports
- Four I/O bus ports, up to 256
- Auxiliary processor port

The 980A is the price/performance leader in the computer world.

Want more information? Get answers by writing or calling Texas Instruments Incorporated, P.O. Box 2909, Austin, Texas 78767; phone (512) 258-5121.

TEXAS INSTRUMENTS
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On National Level

DPer Calls For Mini Association

"There should be a national organization dedicated to minicomputers, an association where users can exchange experiences and put forth ideas, where new developments can be examined, where information can be made available to those requiring it."

According to Jon R. David, president of Systems RDI Corp. in Lodi, N.J., since the number of minicomputer installations is nearly twice that of large, medium and small combined, the minicomputer needs and deserves adequate special treatment in the form of a national minicomputer organization.

David sees the general aims of the organization as follows:

- To provide a forum where new ideas, concepts, equipment and techniques and other appropriate items and matters can be set forth, examined and discussed by knowledgeable and interested parties, and where these parties can establish criteria for communication within their fields.
- To provide a central source where actual and potential minicomputer users and other interested parties can turn for information and assistance on appropriate matters.
- To act in whatever other ways and in whatever other areas may seem to be of interest and/or benefit to the membership.

Some Questions

In order to answer such questions as, What are minicomputers? Can they be programmed? How are they maintained? Why are they used in some applications rather than in others? How do you get information about minicomputer systems? Could *you* use a minicomputer? Should you? David has suggested the following initial projects:

- The production of a monthly publication of sufficient length to service adequately at least the first two general aims; if practical, treatment may also be given to other things, such as the establishment of an international "pen-pal" network, a "situation wanted" section or a "topic of the month" for discussion and/or education.
- The encouragement of members to form local chapters to work on their own and in conjunction with the parent organization.
- The development of special interest groups to treat specific areas of application such as telecommunications, business systems, process control and specific equipment and systems such as mainframes, individual classes of peripherals, interfacing and software systems.
- The formation of a committee to coordinate activities of local and special interest groups, and to coordinate with appropriate groups within other organizations.
- The planning of a national symposium and exposition where interesting equipment and systems can be on display, seminars and workshops can be held on specific topics and education/orientation sessions can be offered.
- The formation of a committee to coordinate with the trade media.

By way of guidelines, David offers the following:

- A question immediately coming to mind is: What equipment will be treated? Some would argue, for example, that intelligent terminals are not minicomputers; others would certainly say that micros do not belong. The group (whose name is Mini), however, should treat these devices and systems – first because they are often part of minicomputer projects, second because equipment and techniques applicable thereto are frequently also applicable to minis and third because sufficient members will probably want them treated.

The group should not endeavor to exclude areas which might not fit a (nonexistant) definition, but rather to encourage participation by everyone and in every area that might prove of interest to the membership.

- The monthly publication should stress timeliness rather than polish. Consideration should be given to utilizing a totally photocopied approach.
- Local and special interest groups will be the backbone of much of the group's operations and accomplishments. To avoid a situation in which local groups become nothing more than social clubs, and special interest groups become snob groups, it is suggested that these groups prepare their newsletters by simply typing them, then send them in to the parent organization where they will be reproduced and distributed to the group's members.
- The National Conference and Exposition will be the main event of each year for the organization. Although paying exhibitors of all sorts will be solicited, efforts should be made to achieve creativity of exhibits so we can show things interesting in and of themselves, and also suggesting new areas to those viewing them. Tutorials and workshops should definitely be available.
- Since the trade press offers an ideal vehicle for both informing and educating the general computer-oriented public, all efforts should be made to promptly inform representatives of the trade organs of interesting developments.

The Computer Caravan brings exhibitors and users together in a user-oriented, professional forum and exposition. The forums, workshops, panel discussions and seminars focus on an exchange of timely, practical information among users and independent experts. And the exposition gives users a chance to review a wide variety of the latest equipment and services, with their current needs in mind. This unique combination of forum and exposition gives computer users the first practical method of learning about and selecting equipment from a variety of manufacturers. And the results in sales are very impressive.

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COMMUNICATIONS

Data Briefs

CRT Terminals Contain Building Block Cards

ANN ARBOR, Mich. – Ann Arbor Terminals, Inc. has introduced a series of complete plug-compatible CRT terminals containing building-block circuit cards directly interchangeable with its Series 200 modular display controllers and keyboards.

Design III is available with serial or parallel data interface in 16 standard RO, KSR and ASR models. Operating speeds to 9,600 bit/sec asynchronous are standard.

The display set consists of 64 upper-case or 96 upper/lower-case characters with display formats up to 40 lines by 80 characters. A built-in MOS dynamic shift register stores a full screen of data.

Prices begin at $990. Delivery is 15 days from 42 Enterprise Drive, 48103.

On-Line Terminal System Expanded

WINTER PARK, Fla. – Financial Data Sciences, Inc. has introduced a typewriter printer, CRT printer and punched card reader to expand its on-line transaction processing system.

The administrative typewriter printer 120 provides typewriter entry and 30 char./sec printing.

The CRT impact printer models 801 and 802 can be linked to several CRTs to produce reports or provide a complete audit trail of all data exchanged between the CRT terminal processor and the CPU. The Model 801 has 80 print positions, the 802 has 120. Both print at 120 char./sec.

The punched card reader 620 reads up to 150 card/min and can be used in conjunction with a CRT, CRT printer and the typewriter printer.

The administrative typewriter printer costs $4,500. The price of the CRT impact printer Model 801 is $4,290, the Model 802 is $4,875. Price of the punched card reader is $3,995. Initial deliveries are scheduled for early 1974. The firm can be reached at P.O. Box 1300, 32789.

Terminal Comes With Selectric

FAIRFIELD, N.J. – A send-receive (KSR) interactive terminal capable of half-duplex operations and available with any model IBM Selectric typewriter has been introduced by Tycom Systems.

The Tycom Model 38-M can provide full-duplex output of customer-selected control functions. A 32-character buffer is standard with a universal output to meet RS232, MIL188 and Teletype-compatible current loop standards.

The terminal uses Ascii code, 110- or 130-char./sec line and interchangeable type fonts.

The Tycom 38-M with acoustic coupler costs $2,350. The typewriter is not included in the price. Delivery is 45 to 60 days from 26 Just Road, 07006.

With Phone Pads
User Keeps Orders Flowing

By Patrick Ward
Of the CW Staff

WASHINGTON, D.C. – Salesmen for Forman Bros., a liquor wholesaler here, are using Touch-Tone phones to key their orders directly to an on-line IBM System/7 at the firm's headquarters.

Not only does the system eliminate keypunching from the order entry process, but it allocates inventory, gives salesmen in the field current inventory information and has improved accuracy overall, according to Martin Resnick, DP manager at the firm.

The system includes an IBM Field Developed Program that Forman Bros. helped IBM design and implement, Resnick stated.

Each morning, Resnick said, the S/7, which is used solely for order entry, is loaded with the firm's current product and customer file. The salesmen use the system from about 8:30 a.m. to 7 p.m.

No voice-response unit is involved, so the salesmen get feedback from the computer by a series of tones. One tone indicates miskeyed customer, product or salesman number, for example, while a different tone signals a product out of stock.

Warning signals are programmed to sound if a salesman exceeds a quantity limit or if a salesman happens to order six bottles of an item which the firm only sells in case lots.

Since the majority of the liquor stores in Washington also have Touch-Tone phones, Resnick said, the salesmen carry Interface Technology Touch-Tone generator pads so they can use dial phones for Touch-Tone keying.

Interface Technology developed these pads to Forman Bros. specifications, Resnick mentioned, because other adapters he looked at were priced in the $150 to $200 range, or about three to four times what the Interface Technology pads cost.

There are only about 10 different tones, Resnick said, and the salesmen do not find them difficult to work with.

Before the new order entry system was started up in January, Forman Bros. had relied on a speech recording device that the salesmen would telephone to record their orders. At the end of the day, keypunch operators would then punch the orders onto cards and verifying and editing would follow.

The data the salesmen enter goes through a Bell 403E6 modem into the S/7 disk for validation and is then transferred to an order file on disk packs. At the end of the day the file is placed on the firm's S/370.

Forman Bros. had to do some "very simple" wiring from the telephone gear to the S/7, Resnick said.

"In straight dollars and not counting goodwill," the new order entry system presently costs Forman Bros. $450 a month more than the system it replaced. Total data entry cost is $1,800/mo, including the $300/mo lease for the programs that Resnick said will be eliminated in January.

Phone costs included $57 each for the 50 Interface Technology Model 720 adapters, $300 for cable and the freight and other installation costs of the S/7.

Datran Sets Texas Network Start-Up

DALLAS – Data Transaction Co. (Datran) has announced it will begin service to its first customers between Dallas and Houston within the next few weeks.

If the specialized carrier does begin service before the end of the year, it will have to move fast, according to industry sources. The company said it has completed construction of 17 microwave tower sites between the two Texas cities but local loops to first customers have not yet been connected by Southwestern Bell.

Despite current problems in obtaining local loops by either specialized carriers, a Datran spokesman said firm installation dates had been obtained from Bell and no difficulties are expected.

The first Datran customers will be operating on a private line rather than switched basis at 2,400-, 4,800-, and 9,600 bit/sec. They will be using a preliminary version of the Datran Digital Communications Console (DCC) which will ultimately be the standard interface to connect users to the switched Datran network.

Although first users were not announced, one source said they would probably include such companies as Texas Instruments, Datronics and other oil companies operating in the area. One prospective user said he currently had a "cancellable contract" for 4,800 bit/sec service between Dallas and Chicago quoting a rate of $1,099.10/mo plus a $200 installation charge at each end of the point-to-point link.

Interconnection Seen Here to Stay

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. – Despite indications to the contrary, the usage of non-carrier customer-provided equipment is here to stay, according to recent statements by regulatory experts.

In similar speeches before the National Association of Manufacturers, Bernard Strassburg, chief of the FCC's Common Carrier Bureau and Neil Swift, director of the Communications Division at the New York Public Service Commission, told users they faced relatively little risk in installing non-carrier equipment.

"Interconnection is here to stay" because it "has not . . . and need not impair the nationwide [telephone] network," Strassburg said. Calling attention to the use of telephone company connecting arrangements, the FCC official reminded users such protective devices were first proposed by AT&T and are still "generally endorsed by the commission.

"There are considerable complaints," he said, "that the interface arrangements are not as efficient and as economical as they should be." Some are "overdesigned or overpriced or tend to degrade rather than protect service." Also, an "excessive and confusing number of coupling devices" now exists, he said. This will be getting "more attention from the commission," he promised.

Echoing similar views, Swift said, "A simpler, less costly [telephone company] interface could be devised, but there is no industry motivation to this end."

Stating that he believes an interconnection status quo will continue for a considerable time, Swift added, "The very worst that could happen from the point of view of the purchaser of customer-provided equipment is that interconnection would be prohibited at some future time."

If this happened, existing customers would be allowed to keep installed equipment in place or the telephone industry would purchase the interconnected equipment, he said.

Turning to the recently implemented interconnection plan of the Rochester Telephone Corp., Swift told attendees the concept "has had a detrimental effect upon the [telephone] company or the telecommunications network."

Based on eight months of operation, troubles reported by customers interconnected under the Rochester plan showed 80% due to telephone company facilities with "less than 20%" due to customer-provided equipment. "I am sure you are aware that this is in flat contradiction to the data provided by AT&T to the FCC," Swift said.

Strassburg said it was understandable that "the combined assault of the Bell System and the National Association of Regulatory Commissioners upon interconnection has created confusion and uncertainty in the minds of existing and potential users."

But he added that the Carterfone ruling was designed to leave users free to employ equipment devices and systems which are "privately beneficial without being publicly detrimental."

SYSTEMS&PERIPHERALS

Bits & Pieces

Xerox Adds Fanfold Form Mover to 7000 Duplicator

ROCHESTER, N.Y. – Using Xerox 7000 duplicators to copy fanfold printout can be enhanced with the company's 7700 conversion unit that costs $45 more per month.

A feeder mechanism automatically moves each fanfold page into place, copies and reduces it to 8-1/2 by 11-inch size in preselected quantities. Copies are sorted into complete collated sets as a one-step function of the 7700.

Ten copies of a page of computer output can be created in 11 seconds. With the computer forms feeder mechanism disengaged, the unit operates as a copy-per-second reduction duplicator, the firm said.

Bidirectional Searching Optional on Techtran's 4100

ROCHESTER, N.Y. – For $165, users of Techtran's 4100 buffered cassette recorder can add bidirectional searching for data files stored on tape.

Files are automatically located in either direction from any point on tape. The feature can be commanded from a remote location, or locally from a keyboard or minicomputer, the company said.

Techtran Industries, Inc. is located at 580 Jefferson Road 14623.

Document Scanner and Digitizer Designed for Micropublishing

SUNNYVALE, Calif. – The DSD500 is a document scanner and digitizer specifically designed for applications in photocomposition and micropublishing, where merging text with graphics is required for preparation of maintenance manuals, illustrated parts lists, catalogs, etc., according to the developer, Dest Data Corp.

The unit scans directly from original artwork, line drawings, illustrations, printed pages and half-tones with a resolution of 500 point/in. both X and Y coordinates.

The DSD500 sells for $47,500 from the company at 1285 Forgewood Ave., 94086.

Need Mini Course?

MADISON, Wis. – Computer professionals with a need to know about the use of minicomputers in data acquisition, real-time information processing and on-line monitoring and control applications are being offered a short course, "Minicomputers in Instrumentation and Control" by the University of Wisconsin here.

Cost of the four-day course is $350 with further information available from Program Director, Dept. of Engineering, Univ. of Wisconsin Extension, 432 N. Lake St., 53706.

Some 360 Use Possible

3330-11 Replacement Less Expensive

By Vic Farmer
Of the CW Staff

SANTA CLARA, Calif. – Memorex is planning to ship its plug- and media-compatible IBM 3330-11 double-density replacement disk drives six months after IBM's first delivery date. The Memorex drives will be priced at 17% or $310/mo lower than IBM's rental cost over a one-year period.

The Memorex 3675 disk drive, in addition to being supported on 370 mainframes under virtual memory, will be available through an optional enhancement to 360 users of Mod 65 through Mod 195 operating under OS/MFT or MVT version 21.6 and up. IBM limits its double-density drives to 370s only.

For all practical purposes, specifications between the two units are nearly identical with Memorex pulling a slight edge of 3 msec in access time (IBM's 30 msec to Memorex's 27 msec). Data transfer rate for both units is 806 kby te/sec with total capacity at 400M bytes.

Memorex, like IBM, achieved double-density by doubling the number of cylinders per disk pack and using different read-write heads in its 3670, 3330-type replacement drives.

A new feature on the 3675 is "write format release," which makes possible performance improvement by freeing the control unit during the completion of a format write command chain, the company said.

The 3675 may be freely intermixed with the current 3670 drives on a 3671 control unit to form a system under 370 operation only. The current 3670 can be field-converted into the new 3675 for $19,000, although initial conversions will be by replacement.

Installed Memorex customers on lease may upgrade without penalty. Control unit and other hardware changes required to support the new 3675 will also be field-installable.

The 3675 drives cost $1,535/mo on a one-year lease, $1,400/mo on a two-year lease and $54,000 straight purchase.

Initial deliveries of the 3675 are scheduled for the fourth quarter of 1974.

Double Density Pack, Too

SANTA CLARA, Calif. – Memorex is now taking orders for its IBM-compatible double-density disk pack, the Mark XD.

The Mark XD disk pack is available with a mechanical interlock to prevent it from being accidentally interchanged on single-density drives.

Servo surfaces will be written for the narrower tracks on all Mark XD's and they will be available, unformatted, for less than $900 each in small quantities. There is an additional charge for formatting. Delivery is 30 days.

Will IBM System 380 Use a Deep Freeze?

By Richard Murphy
Special to Computerworld

YORKTOWN HEIGHTS, N.Y. – Picture a super-dense and super-fast computer with memory and CPU in a one-cubic-ft compartment of a desk-size liquid helium refrigerator. That would be a radically different computer, right? Well if IBM stopped present development, built from its research effort and resisted marketing constraints caused by its lease base, that could describe a typical IBM computer 10 years from now.

This radically different hardware would probably be described with the adjective "super."

Super-dense memory and super-fast CPUs appear to be major aims of present IBM research revealed during a recent briefing at the Watson Research Center here.

Super-dense might mean 10M bit/sq in. in silicon semiconductor material. IBM, however, sees a definite fabrication limit for storage arrays in semiconductor devices even though it can make super-small circuit elements with electron microscope techniques.

Magnetic bubble devices under investigation could boost the definition of super-dense to gigabit/sq in., according to Dr. Praveen Chaudhari, manager of IBM's Amorphous and Magnetic Materials Group.

When a critical value of magnetic field crosses a thin film of suitable material, the magnetic domains within the material suddenly jump into small cylindrical zones (bubbles).

Controlling and sensing the magnetic bubbles at particular locations in the material creates memory. The size of the bubble, at present, determines memory density.

Magnetic bubbles can be formed in the thin films of semiconductor crystal material having regularly spaced patterns of atoms. Amorphous material (irregular patterns of atoms) in thin films has also shown magnetic bubble properties, but the bubbles are smaller.

IBM researchers appear to be concentrating on amorphous films for two reasons. They are easier to make than crystals. More importantly, said Chaudhari, the knowledge of amorphous material is just unfolding and the limits for magnetic bubble size are yet to be determined.

Super-dense magnetic bubble memory has a major drawback – It is slow compared to today's CPU technology.

If both CPU and memory had to meet super-fast criteria, the computer would likely be more of a refrigerator than a bubble maker. Super-fast is nebulous until some operation is described.

In basic terms, the time in seconds for a device to change state (switching) could be a measure. IBM claims to be committed to the Josephson tunnel junction circuit for which super-fast is estimated at less than 10 picosec, according to Dr. Wilhelm Anacker, manager of IBM's Exploratory Memory Group.

The Josephson circuit depends on superconductivity (absence of electrical resistance in some materials at very low temperature) and electron tunneling (ability of electrons to penetrate very thin insulators). This approach to super-fast needs a super-cold environment such as liquid helium at four degrees above absolute zero. Since Josephson devices can be arranged in super-compact forms to obtain memory, integration of CPU and memory using these devices would be the basis for a refrigerator computer.

If the trend at IBM as summarized by Dr. Ralph Gomory, Research Division Director, is moving from the central area of the computer outward toward the customer, an operator interacting with a refrigerator computer would be faced with some different peripherals.

Radically different peripherals were described with no moving parts. Magnetic bubbles look like the direction IBM would take to replace disks and tapes. This slower speed operation could be done with no moving mechanical parts using the super-dense magnetic bubble memories.

Further, IBM has investigated the use of a laser beam to write or erase magnetic spots in the surface of amorphous bubble films even though work on optical memories is claimed to be halted.

Replacing keyboards with speech-activated devices may seem obvious, but everyone tried it has come up short, according to Dr. Fredrick Jelinek, manager of the Speech Processing Group. IBM's present decision to venture into the speech-recognition arena suggests confidence in some method of addressing computer systems in continuous, unstructured English.

Approaching the refrigerator computer with gigas of amorphous magnetic bubbles, crying "food and exercise, dammit!" and getting a silent response in gas images is radical isn't it? But will IBM build it into the 380 series? Only time will tell.

CI Notes

Eniac Patent Issue Dies

MINNEAPOLIS – Honeywell, Inc. and Sperry Rand Corp. have declared settled the litigation between them involving Sperry's patent on the Eniac computer system, invented in 1946.

The firms have indicated they will not appeal a judgment handed down last April by Federal District Court Judge Earl R. Larson declaring the patent invalid [CW, April 25].

Both firms said they agreed not to assert claims for infringement of present EDP patents and applications and Sperry Rand will pay Honeywell $3 million.

The litigation between the two firms lasted six years, with Honeywell charging antitrust violations against Sperry Rand and Sperry Rand countersuing for patent infringement.

NCR Sets On-Line Group

DAYTON, Ohio – NCR has established a special systems group for the development, manufacture and support of customized on-line computer systems.

The group, according to NCR President William S. Anderson, will have program management responsibility for projects, including overall system design, development of special hardware and software and installation and support both in this country and abroad.

Honeywell to Buy GE-PAC

MINNEAPOLIS – Honeywell, Inc. has agreed in principle to acquire GE's Process Control Product Section relating to the manufacture and sale of software and hardware under the GE-PAC 4000 Series trademark.

In addition, Honeywell will obtain nonexclusive rights to manufacture and sell the GE-TAC data transmission system.

Boeing Co. has acquired manufacturing rights for the latest models of the GE-TAC remote terminal, the GE-TAC 7020 Models 2 and 4, which it will sell individually and as part of its utility Supervisory Control and Data Acquisition system.

Supershorts

Pertec Corp. has signed a three-year $11 million agreement to supply CRT terminals to Singer Co.'s Business Machines Division for use in the System Ten. Shipments are scheduled to begin in February 1974.

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Digital Equipment Corp. has been awarded a $16 million contract by the General Services Administration to supply computer components and equipment.

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Tymshare, Inc. and Unilever, Ltd. have agreed in principle to form a jointly owned United Kingdom corporation to provide remote-access services in the UK and Ireland.

Report Sees 49% Growth in '73

Mini Shipments to Hit $2 Billion in '77

By Molly Upton
Of the CW Staff

NEWTON, Mass. – Shipments of minicomputers by U.S. manufacturers will reach $2 billion in 1977, compared with $700 million in 1973, according to a study by International Data Corp. on the minicomputer marketplace.

In 1972, worldwide shipments of minicomputers grew 42% to $470 million, and another 49% increase is forecast for 1973, the study indicated.

The minicomputer market is expected to grow even more rapidly than the minicomputer market, reflecting increased utilization of installed CPUs and new applications such as terminals, data collection and data entry systems that are based on special-purpose processors, the report noted.

Combined minicomputer/peripheral shipments to world markets in 1973 should reach over $800 million, growing over 20% per year through 1977, when shipments will total almost $2.5 billion, according to the study.

The projected high volume of shipments, the report claimed, is justified by emerging application areas such as teleprocessing network implementation and sophisticated data entry techniques. In addition, autotransaction and small business systems will extend computer use into major new areas, according to the report.

Industrial automation applications are another growth area for minis, IDC noted.

The report defines a minicomputer as a processor that is general-purpose by design and sold by the manufacturer as a minicomputer. The current base price for a CPU with 4K words is generally $3,500 to $25,000. Word size is typically 24 bits or less, and memory typically expandable from 4K to 32K.

The booming growth curve expected in worldwide shipments of minis will taper off slightly after 1973, but maintain growth rates of over 32% until 1976, when the rate will drop to 27%, with total shipments worth $1.65 billion, the report said.

The number of minis installed in the U.S. by the end of 1973, with a 53% growth rate, is expected to surpass the number of large, general-purpose systems, the study indicated.

In the U.S., minicomputer installations at the end of 1972 totaled 43,130, or 75% as many as the larger systems.

By 1976, the value of shipments abroad will approach half of the value of domestic shipments, according to IDC figures.

The international market stood at $136 million in 1972, compared with $334 million for the U.S.

By 1974, the figures are expected to be $302 million and $673 million respectively. By 1977, the international market will have grown in comparison with the domestic market, reaching $680 million compared with $1.3 billion for the U.S.

The report cited several factors that separate the minicomputer market from that of the larger, general-purpose machines.

The minicomputer area is "distinctly OEM in its orientation." Although the value of 1972 shipments to OEM accounts represented less than half (47%) of the total, almost 60% of minicomputer and 95% of minoperipheral shipments were to the OEM segment, the report noted.

The OEM sector should continue to show stronger growth in terms of units because "minicomputer manufacturers are not willing to make the investment required to produce specialized turnkey systems," and "minoperipherals do not generate enough revenue on a per unit basis to justify the investment in service organization, software and interfaces" to develop the end-user segment," the report observed.

Over the next five years, the OEM sector will grow to two thirds of total minis shipped, but drop to one third of total value, reflecting stabilization of end-user prices for an average system, while OEM prices continue to drop, the report said.

In 1972, the average value of an OEM mini was $12,800 whereas for the end-user market the pricetag was $30,200.

Minicomputers will face relatively little competition from microprocessors, which for the most part "will create new horizons, not overlap with minicomputers," according to the report. Chip suppliers, the report said, estimate only about a 20% application overlap.

In the miniperipherals area, 1972 shipments rose 87% in volume and 91% in value. By 1977, shipments will reach $561.5 million from the base of $174.8 million in 1973, according to the report.

Cartridge disk drives will increase their share of the total miniperipherals expenditures, from 45% or $48 million in 1972 to 49% in 1974 or $125 million, and remain at 49% or $275 million in 1977.

Low-speed line printers are expected to jump from a 17% share to 36% share of the total market in terms of value, or from $18 million to $200 million.

Medium-speed line printers will continue to grow in value, although lose market share, the report indicated.

In 1972, the segment, valued at $20 million, held 19% of the market. In 1977, the figures will be $52 million, but a 9% market share.

The same trend applies to tape drives, which will go from $21 million or 20% in 1972 to $35 million or 6% in 1977, according to the report.

Definition of Predatory Pricing Crucial in IBM-Telex Appeal

By E. Drake Lundell Jr.
Of the CW Staff

TULSA, Okla. – The IBM appeals strategy in its antitrust suit with Telex will

ANALYSIS

likely revolve around the issue of predatory pricing, legal sources said last week after seeing the amended findings of fact and conclusions of law issued by Judge A. Sherman Christensen in the case [CW, Nov. 21].

Much of Christensen's ruling centers on the fact that IBM made "predatory" pricing moves designed to destroy its competition in the plug-compatible peripherals area. If IBM can weaken that ruling, the whole decision may fall with it.

In most precedents predatory pricing is considered as setting prices for products below their actual cost in order to drive competition from the market.

But in Christensen's amended ruling it is clearly spelled out – at the insistence of IBM lawyers – that IBM never priced products below cost.

Revised finding 111A reads: "There was no evidence that IBM reduced below cost and a reasonable profit. Indeed, when announced, the profitability (of the units in question) was anticipated to be in excess of 20%."

"Likewise, at the announcement of FTP [fixed term plan] it was anticipated that the profitability of the products to which it applied would be at least 20%.

"Those profit margins in part, of course, would have been achieved by obtaining leases of products which would have otherwise been made by Telex and other PCMs [plug-compatible manufacturers]. These price reductions are found to be predatory."

Most antitrust lawyers contacted could not think of one other case in which a firm was found guilty of predatory pricing without cutting prices to a level below the cost of producing the product or at least below reasonable profit expectations.

So the ruling here, if upheld, would be precedent-setting in this area as well as others – particularly the market definition question.

In that area, most lawyers consider Christensen's ruling that IBM monopolized a market for plug-compatible equipment to be equally precedent-setting.

UK Service Bureaus Start Right in '73

LONDON – The British service bureau and software business is off to a strong start this year with first quarter revenues at a record high of $56.6 million, according to a survey by the Department of Trade and Industry.

In 1972, the same sector's revenues totaled $42.7 million.

More than half of the 1973 revenues, or $31.8 million, was derived from processing of custom-designed programs, package programs, time-for-sale and remote-access services, according to the survey.

The processing of custom-designed programs has shown a steady increase, but use of package programs has declined compared with the last quarter of 1972, although up slightly from the first quarter of 1972.

The time-for-sale market has been declining, but remote-access services have jumped from $2.3 million in the first quarter of 1972 to $5.3 million, the survey indicated.

Revenues from professional services, including programs and consultations, accounted for $17.1 million of the total $56.6 million, the report said. In the same 1972 period, the figure was $10.8 million.

Staffing is seen slowly returning to the levels of before the recession of 1972.

The 165 service bureaus and software houses responding to the survey indicated a total employment of 15,118 compared with 14,473 in the same 1972 period. But in 1971, the figure was 15,679.

The number of professionals, including consultants, programmers and analysts totaled 5,104 compared with 4,630 in the 1972 period.

International Roundup

Honeywell Shifts Policy On Australian Contracts

SYDNEY, Australia – Honeywell plans to increase the content of Australian-made components in proposals to the Australian government, but will not set up any full-scale computer manufacturing in this country.

Honeywell is expected to include CRTs or other components made either by Amalgamated Wireless Australia Ltd. (AWA) or Information Electronics, instead of similar Honeywell gear, as part of bids for large-scale government contracts.

W.R. Willmert, vice-president, manufacturing planning of Honeywell, noted that Australia does not now manufacture cores and multilayer circuit boards, among other key components.

Software Acceptable

The Australian government currently requires a certain percentage of equipment bid for government purchase to be manufactured in Australia, but is rapidly modifying its position by accepting software as an alternative to hardware for offset requirements, he noted.

In addition, Willmert said, Australia could possibly get into internstional electronics by following trends in other countries and trading off lower technology jobs and taking on higher technology tasks, he said.

More than two-thirds of revenue from a Honeywell CPU currently stays in Australia, Willmert said.

Honeywell, he said, would need a $25 million market annually to warrant building a plant for minicomputers.

Honeywell is estimated to hold 17% of the total Australian market, and to have installed over 200 systems there.

Aussie POS Seen Growing

SYDNEY, Australia – The Australian point-of-sale market is estimated to be worth in excess of $36 million over the next five years, according to Laurence J. Abzug, Singer's marketing director for retail systems, Asia and the Pacific.

About 15,000 point-of-sale retail terminals will be installed in Australia within the next five years, he said.

Univac 120 Goes to Museum

JAPAN – A Univac 120, the first business computer used here, was presented to the National Science Museum of Japan.

Until 1961, about 70 units of the Univac 120 were in active use. With a core of 612 vacuum tubes, the machine has an adding capacity of 130,000 that of a Univac 1100.

Worldwide Trade Agency Proposed To Regulate Broadening DP Industry

By Molly Upton
Of the CW Staff

NEW YORK – "If the regulatory approach is to be applied to the data processing industry, it will have to be done on a world scale," observed Frederic G. Withington, head of the data processing service program at Arthur D. Little.

Noting that the recent IBM-Telex judgment gives legal force to the idea that computer manufacturers' control over their customers and competitors must be regulated, Withington suggested the establishment of a Federal Data Processing Commission.

This agency would be patterned after the Federal Communications Commission, which, although its record may be "imperfect, most would agree it has managed fairly well to protect the public interest, foster reasonable competition and still permit new technologies (and whole new industries based on them) to be introduced," he said here recently.

But, since within the DP industry there is a strong trend toward multinational firms, Withington suggested a supranational regulatory body.

Firms Spreading Out

"If present trends continue unchecked by national government actions, continued mergers of computer companies could culminate in four or five multinational suppliers of general-purpose computers, each having facilities and customers in all parts of the world," he said.

"The familiar pattern of an entrepreneurial nationally oriented industry will disappear and it will become essential to create a regulatory agency having worldwide authority," he predicted.

IBM, he noted, is already a world company, and he cited several moves by other DP firms to acquire a broader base for international operations.

Honeywell acquired GE's computer division and Bull, while Sperry Rand bought RCA and several smaller companies.

NCR and Control Data Corp. are moving by degrees toward full amalgamation.

CII, Siemens and Philips have formed Unidata, and through Siemens and CII, Unidata has a cooperative arrangement with Hitachi-Fujitsu.

The Japanese government has prompted the combination of DP firms into three groups: Hitachi-Fujitsu, Nippon Electric-Toshiba, and Oki-Mitsubishi.

And Nixdorf Computer has entered the U.S. through the acquisition of Victor's computer division, and is negotiating with ICL.

Although there is no precedent for such regulation, the United Nations is exploring ways of regulating world companies.

"It seems that if the regulation Judge A. Sherman Christensen has found necessary is to be made workable, the UN effort or something like it is going to have to succeed," Withington said.

At the UN, a group of eminent persons appointed by Secretary General Kurt Waldheim has conducted a round of public hearings to see if "some form of accountability to the international community" can be applied to companies that operate internationally, according to a UN secretariat report.

Although business leaders are not ready to accept anything resembling a worldwide version of the Federal Trade Commission, many have little objection to the UN establishing a center for the exchange of information about multinationals and possibly a system for registering those firms that would subscribe to a voluntary code of conduct.

Prince Resigns Ampex

CW West Coast Bureau

LOS ANGELES – Eugene E. Prince, vice-president and general manager of Ampex Computer Products Division, has resigned following differences over policy matters, a company spokesman confirmed.

Charles V. Anderson, a veteran Ampex executive has been named new vice-president and general manager on an interim basis.

Anderson joined Ampex as a vice-president of corporate manufacturing in Redwood City in July. He had just returned from Europe where he had been a vice-president and general manager for Ampex International.

He has been with Ampex since 1951, with the exception of 1961-63.

Approximately 30% of Ampex Corp.'s revenues are derived from its Computer Products Division.

Microprogramming Lets Interdata Keep One-Level Architecture

OCEANPORT, N.Y. – Microprogramming has enabled Interdata, Inc. to keep one user-level architecture since its first model, thus offering compatibility throughout the product range, according to Ronald A. Paterson, vice-president of marketing of Interdata.

"The hardware keeps improving – more performance at lower cost – but because of microprogramming we can make the user-level processor appear to be the same," he said.

The one-level architecture is the cornerstone of Interdata's marketing approach, both to the end user and OEM segments of the industry.

CPUs to OEMs

Currently, about 60% of Interdata's revenues stem from OEM sales, and 40% from end users. In two or three years, he commented, the figures will shift to perhaps a 50-50 split. But even then, the majority of CPUs, perhaps as high as 80%, will be going to the OEM market.

The OEM market is where Interdata finds the high unit volume of CPUs which enables a firm to grow, to keep costs down and thus be competitive in the end-user market, he said.

"High unit volumes also enable us to continue investments in vertical integration programs – such as our own PC board facility and manufacture of our own paper supplies," Paterson said.

"The typical OEM starts off with one medium-price product. But he must be able to expand his product line in both directions, toward the low price end and the high price end. He faces the problem of maintaining his product line; he'd like a high degree of parts commonality," he observed.

"And, a couple of years down the road, he must redo his product line – but he would like to hold that new investment to a minimum. OEMs have been known to get 'the shakes' when they're told they have to redo their software and peripheral interfaces.

"Interdata keeps pushing costs down, and at the same time keeps pushing performance up . . .

"We want to do both, but we insist on doing them in a way which preserves compatibility with our previous products.

"We are just now coming into multiprocessor hierarchical systems, in which a powerful minicomputer manages several medium mini 'foremen,' which in turn supervise many black box controllers."

Software, beyond a doubt, is the principal challenge in the mini industry, Paterson found. "In 1974, for the first time, we will spend more money on software development than on hardware development. And that, I think, is a very significant fact," Paterson concluded.

Orders & Installations

The Federal Intermediate Credit Bank of St. Paul has ordered 152 Datapoint 2200 dispersed data processing systems as part of a Regional Management Information System designed to permit overnight updating and on-line access of master files.

American Express Co. has ordered four minicomputer-based 3200 Data Management Systems from Lockheed Electronics Co., Inc., for use at its New York center for processing Travelers Cheques.

Sisters of St. Mary has ordered a Univac 1106 to form the core of a health care information system serving five Midwest hospitals administered by the congregation.

The University of Minnesota has ordered a Recol 100E system from Dynamic Information Systems, Inc. to provide multi-operator access to the university's central addressing file.

Kaiser Foundation Research Institute has placed an order with Analytical Development Associates Corp. for hook-up to the Mednet communication system and for installation of instruments for performing kidney function tests.

Intermediate School District 109, Seattle, Wash., has purchased a Sigma 6 from Xerox Corp. for administrative data processing.

Publix Super Markets, Inc. has ordered 30 NCR 255 point-of-sale systems valued at $2 million.

Western Ohio National Bank has installed an NCR Century 101 to provide unified statement banking capabilities.

Northwest Orient Airlines has ordered 20 computer-operated automatic ticket printers from Control Data Corp.

For Possible Lawyer Misconduct
Adapso Wants Probe of IBM-CDC Case

NEW YORK – The Association of Data Processing Service Organizations, Inc. (Adapso) has called for a disciplinary investigation into the conduct of attorneys in the IBM-Control Data Corp. antitrust suit which led to the destruction of the index on IBM's documents.

Citing the refusal by the New York and American Bar Associations to proceed, Adapso Executive Vice-President Jerome L. Dreyer said the association had decided to make public its correspondence with these groups.

"We are publishing this information in the hope that the press and the public will insist that the bar investigate these issues. We are not concerned with past conduct," he said.

"We are terribly concerned, however, that there may be a repetition, with the most serious adverse consequences to the administration of justice," he continued.

As part of the correspondence between Adapso and the two groups, John C. Bonomi, chief counsel of the Committee on Grievances of the Association of the Bar, replied to Adapso President T.J. O'Rourke indicating, "This office would not wish to take any action which might be interpreted as an attempt to interfere with the conduct or the outcome of pending litigation [U.S. vs IBM]."

In a letter to Powell Pierpoint, chairman of the Committee on Grievances, O'Rourke countered by citing the American Bar Association's decision in September that lawyers whose conduct contravenes the Code of Professional Responsibility in the Watergate case should be subjected to prompt and appropriate disciplinary proceedings.

"It would be most unfortunate if the bad misconduct [in the IBM-CDC case] in fact is unchallenged, uninvestigated and unpunished for several years, merely because of the vagaries of antitrust litigation," O'Rourke concluded.

Emphasis in Japan Now On Minis and Terminals

By Shukan Computer
Special to Computerworld

TOKYO – The state of DP here is undergoing changes, with emphasis on increased utilization of minicomputers, on-line equipment and terminals, according to a survey report by the Japan Information Development Association.

There is currently an average of 3.6 computers per company with about 32 peripherals, the report indicated, adding that it expects systems to be upgraded 2.7 times in the next five years.

Terminals have increased 2.5 times, and increased equipment diversification is expected, the report said.

The survey indicated 84% of respondents expect to enlarge the scale of their computer systems in five years.

Sixty-two percent of businesses have upgraded their systems at least once since installation, and roughly half of all industries plan to upgrade during 1973 or 1974.

The average for all industries, 3.6 systems, far surpasses the 1.9 systems of the previous year.

This growth is attributed chiefly to the expansion in the scope of minicomputer application and the volume of business handled by minicomputers. Also noticeable is a rise in the multiple use of two and three systems.

The average number of peripherals per company based on the total number of systems is 32 compared with 12 the previous year, with external support memory units such as magnetic tape equipment and disk equipment constituting a high ratio.

The three basic methods of linkage for on-line systems are:

- Linking terminals within the company to a CPU, also within the company.
- Linking terminals within the company to the CPU of an outside computer.
- Linking terminals within the company to the CPU of the Telegraph and Telephone Corp.

Including systems in methods used, the first method is used by 86.4% of the companies with computer systems, second method by 10.9%; and the third method by 7.4%.

There are currently 66.4 terminals per company, but in five years they should grow two-and-a-half times to 151 units. A marked increase in CRT displays (current ratio of 5.3% relative to the total number of units to 23.8 in five years), a rise in the use of conversational modes via remote batch smart terminals, and in the use of intelligent terminals appear to be future directions.

Among companies using on-line systems, the current average of 32.4 specific circuits per company will be 64 in five years, and public circuits, nearly 65.

Cheers for 1-Man Show...When It Comes to Software Contracting

By Kenneth P. Seidel
Special to Computerworld

Elliott Raphaelson of Chase Manhattan Bank set forth his preferences in seeking outside software custom programming services [CW, Aug. 22]. Many of the recommendations are worthy of consideration when it comes to setting up a contract with an outside supplier.

Overlooked in his analysis and advice, however, is the possibility of dealing with free-lance consultants rather than full-fledged incorporated software houses.

Raphaelson advised the user to "examine closely the latest financial information available on any proposed vendors" because the "mortality rate is high in the custom software business."

I should like to stand up for the one-man show. It is often difficult for large organizations to think small rather than big. They frequently rule out the use of an individual consultant or tiny software house, for "reasons" of distrusting a small enterprise, *a priori*, or possible fear of putting their own staff in a bad light.

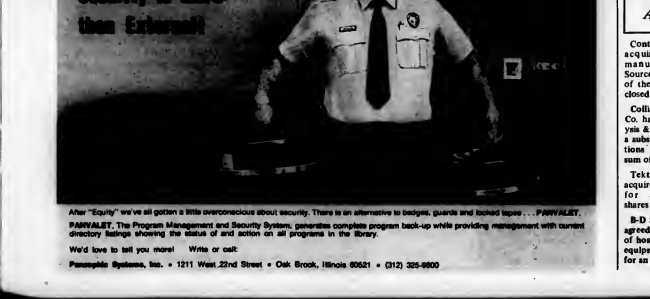
Viewpoint

But the truth is that the user's surest guarantee of low-cost success lies in contracting with the small guy, because the user chooses a specific individual and contracts for him.

With a large software house, it is practically impossible for the user to control the assignment of project personnel assignments.

On a purely philosophical basis, I would hope to see more appreciation of "rugged individualism" and less deference to monolithic corporations.

Kenneth Seidel is a consultant in Fallbrook, Calif.



Acquisitions

Control Data Canada Ltd. has acquired the punched card manufacturing division of Source Data Control Ltd. Terms of the acquisition were not disclosed.

Collins International Service Co. has acquired Spectrum Analysis & Frequency Planning, Inc., a subsidiary of MCI Communications Corp., for an undisclosed sum of money.

Tektronix, Inc. has agreed to acquire Grass Valley Group, Inc. for approximately 470,000 shares of Tektronix common.

B-D Spear Medical Systems has agreed to acquire the Medac line of hospital data communications equipment from Metric Systems, for an undisclosed sum.

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Itel Figures Skyrocket for 3, 9 Months

SAN FRANCISCO – Itel Corp. revenues and earnings showed spectacular progress during the three- and nine-month periods ending Sept. 30.

President Peter S. Redfield noted the results represent contributions from each operating division and particularly the company's rapidly growing business and financial service activities.

"These have become very important factors in Itel's strengthened performance and outlook and augur well for the prospects of the other financial and business service activities we have recently begun," he said.

All Itel figures have been restated to exclude the operating results of Information Storage Systems, Inc., which was sold to Univac in August. Any gains from that sale will be reported at the end of the year.

In the three months, revenues rose to $38.4 million from $18.9 million, while earnings jumped to $2.8 million or 38 cents a share from $232,000 or 3 cents a share.

On the basis of income from continuing operations, the figures were $2.3 million compared with $747,000.

In the nine months, revenues reached $95.3 million from $53.7 million and earnings totaled $5.3 million or 71 cents a share compared with a loss of $2.6 million or 35 cents a share in the same year-ago period.

Income from continuing operations was $4.1 million compared with $1 million in the 1972 period.

Computer Machinery Progresses In Third Quarter and Nine Months

SANTA MONICA, Calif. – Key-to-disk maker Computer Machinery Corp. reported improved revenues and a turnaround in the third quarter and nine months.

"We are pleased with our progress to date and expect to record further gains during the balance of this year and in 1974," President Thomas L. Ringer said.

Before special credits, the firm earned $800,000 in the nine months compared with a loss of $2.4 million in the year-ago nine-month period. Earnings for the three quarters totaled $1.8 million or 36 cents a share compared with the 1972 period loss of $2.3 million or 48 cents a share.

Revenues reached $35.9 million from $19.9 million in the year-ago period.

In the quarter, earnings, including a $426,000 special credit, totaled $849,000 or 16 cents a share compared with a loss of $212,000 or 4 cents a share in the 1972 period.

Results of operations in 1972 were adjusted to reflect adoption of a lower marketing deferral rate and revision in the carrying value of certain equipment purchased from Transamerica Computer Co., Inc.

CMC acquired tape drive maker Cipher Data Products during the third quarter, and installed its newest product, the CMC 12 Keyprocessing System.

The firm is restructuring its European operations and negotiating distributorship agreements in new international markets.

1st Quarter Brightens for Graham, New Product Expenditures Cited

GRAHAM, Texas – Graham Magnetics, Inc. improved in the first quarter, despite "rapidly increasing expenditures on new products."

In the period ended Sept. 30, the tape maker earned $252,448 or 27 cents a share compared with $220,403 or 24 cents a share in the same year-ago quarter.

Revenues rose to $3.3 million, up from $2.4 million for the period last year.

"The first quarter earnings rise was affected by rapidly increasing expenditures on new products, including the introduction of our new Thermo-465 magnetic tape, and expanding outlays in new product development involving areas where the company is anticipating early returns," Chairman G.A. Jaggers said.

"Barring possible shortages of certain critical materials, 1974 is expected to be a period of accelerating growth in sales and attendant earnings," he said.

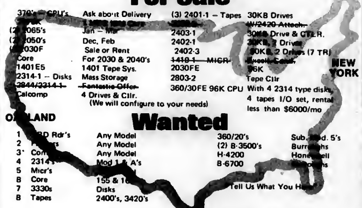
In the audited results for the year ended June 30, the firm earned $986,129 or $1.06 a share, up 10% from the pre-audit earnings of $900,000.

Microdata Reflects Start-Up Costs

IRVINE, Calif. – Start-up costs associated with broadening the product and customer base caused Microdata Corp.'s earnings to dip for the year Aug. 31, according to President Donald W. Fuller.

The minicomputer maker earned $623,469 or 41 cents a share, including a $280,000 tax credit compared with $676,643 or 51 cents a share, including a $318,000 tax credit in 1972. Revenues rose to $8.7 million from $6.2 million in the year-ago period.

"The company is now favorably positioned in its chosen markets and anticipates increased sales and earnings for the coming year," Fuller added.



Earnings Reports

GRAHAM MAGNETICS
Three Months Ended Sept. 30

	1973	1972
Shr Ernd	$.27	e$.24
Revenue	3,337,460	2,358,194
Earnings	252,448	220,403

e-Adjusted for 3% stock dividend in March 1973.

INFORMATICS
Six Months Ended Sept. 29

	1973	e1972
Shr Ernd	$.36	$.16
Revenue	10,658,000	9,470,000
Earnings	612,000	269,000

e-Restated.

TELEX
Three Months Ended Sept. 30

	1973	1972
Shr Ernd	.....	$.07
Revenue	$22,555,000	21,490,000
Earnings	(6,150,000)	704,000
6 Mo Shr	.....	.14
Revenue	42,315,000	40,944,000
Loss	10,157,000	1,415,000

DATRONIC RENTAL
Three Months Ended Sept. 30

	1973	1972
Shr Ernd	$.15	$.12
Revenue	1,207,944	937,299
Earnings	107,900	50,596

VARIAN ASSOCIATES
Year Ended Sept 30

	1973	1972
Shr Ernd	$.95	$.52
Revenue	241,290,000	203,757,000
Spec Cred	.....	e258,000
Earnings	6,758,000	3,790,000
3 Mo Shr	.29	.23
Revenue	62,596,000	53,349,000
Earnings	1,925,000	1,685,000

e-Gain on sale of land.

SYCOR
Three Months Ended Sept. 30

	1973	1972
Shr Ernd	.....	$.17
Revenue	$8,652,100	3,835,000
Spec Item	e(1,514,100)	b141,000
Earnings	(775,600)	275,100
9 Mo Shr	.81	.22
Revenue	22,850,900	9,912,000
Spec Item	e(619,100)	b220,000
Earnings	1,308,000	434,000

e-Charge; loss from change in accounting method for transactions involving a portion of equipment on lease that had been sold to a third party and previously reported as sales, less tax credits; b-Tax credit.

ELECTRONIC DATA SYSTEMS
Three Months Ended Sept. 30

	1973	1972
Shr Ernd	$.33	$.27
Revenue	29,185,778	26,077,885
Earnings	3,901,495	3,179,454

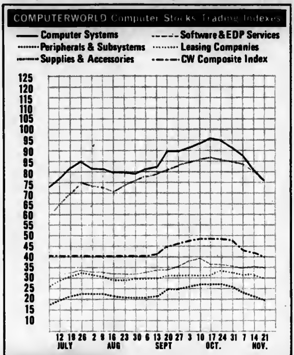
PROGRAMS & ANALYSIS
Three Months Ended Sept. 1

	1973	1972
Shr Ernd	$.06	$.04
Revenue	760,071	585,199
Earnings	63,252	38,134
9 Mo Shr	.16	.11
Revenue	2,185,031	1,675,837
Earnings	170,746	118,455

ELECTRONIC MEMORIES & MAGNETICS
Three Months Ended Sept. 29

	1973	a1972
Shr Ernd	$.39	$.14
Revenue	26,785,000	20,475,000
Disc Op	.....	(11,000)
bSpec Cred	1,128,000	400,000
Earnings	2,361,000	1,014,000
9 Mo Shr	.93	.14
Revenue	78,429,000	54,364,000
Disc Op	.....	116,000
bSpec Cred	2,476,000	1,138,000
Earnings	5,787,000	1,574,000

a-Restated. b-In 1973, tax credit plus gain on repurchase of bonds. In 1972, tax credit and sale of assets of affiliate in excess of carrying value.



Computerworld Stock Trading Summary

All statistics compiled, computed and formatted by TRADE★QUOTES, INC. Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		1973 RANGE (1)	CLOSE NOV 21 1973	WEEK NET CHNGE	WEEK PCT CHNGE
N	BURROUGHS CORP	211-252	238 3/4	+1 3/4	+0.7
N	COLLINS RADIO	16- 26	24 3/4	0	0.0
O	COMPUTER AUTOMATION	8- 20	11 1/2	- 5/8	-5.1
N	CONTROL DATA CORP	31- 62	37 3/4	-1 1/2	-3.8
O	DATA GENERAL CORP	28- 49	38	+ 1/2	+1.4
O	DATAPOINT CORP	10- 21	13 1/2	-2 1/2	-15.0
O	DIGITAL COMP CONTROL	2- 8	2 1/4	- 1/8	-5.2
N	DIGITAL EQUIPMENT	73-117	95	- 1/2	-0.5
N	ELECTRONIC ASSOC.	4- 9	3 7/8	+ 1/8	+3.3
A	ELECTRONIC ENGINEER.	6- 14	8 3/4	-1 1/2	-14.6
N	FOXBORO	23- 46	38	- 3/4	-2.8
O	GENERAL AUTOMATION	22- 58	38 1/2	- 1/2	-1.0
O	GRI COMPUTER CORP	1- 3	1 1/8	- 1/4	-18.1
N	HEWLETT-PACKARD CO	73- 99	90	+ 1/4	+0.2
N	HONEYWELL INC	68-159	88 1/4	-3 3/8	-3.6
N	IBM	240-540	276 5/4	-10 1/4	-3.0
O	INTERDATA INC	7- 14	9 5/4	- 3/4	-7.1
O	MICRODATA CORP	2- 10	2 3/4	- 1/2	-15.3
N	NCR	27- 46	34 3/4	-3 1/4	-8.5
N	RAYTHEON CO	22- 35	38 1/4	-2 1/2	-7.6
N	SINGER CO	45- 74	44 3/4	-2 1/2	-5.2
N	SPERRY RAND	36- 56	47 1/4	+ 3/4	+1.8
A	SYSTEMS ENG. LABS	2- 8	2	- 1/2	-20.0
N	TEXAS INSTRUMENTS	83-130	110 1/4	+1 1/2	+1.3
O	ULTIMACC SYSTEMS INC	1- 11	1 1/2	- 1/8	-7.6
N	VARIAN ASSOCIATES	10- 20	11 1/2	- 5/8	-5.1
N	WANG LABS.	15- 34	21 3/4	- 5/8	-2.7
N	XEROX CORP	130-180	137 1/2	-1 3/8	-0.0

LEASING COMPANIES

EXCH		1973 RANGE (1)	CLOSE NOV 21 1973	WEEK NET CHNGE	WEEK PCT CHNGE
A	BOOTHE COMPUTER	8- 8	1 1/8	0	0.0
O	BRESNAHAN COMP.	1- 2	2 1/8	0	0.0
O	CONDISCO INC	5- 17	8	- 1/8	-2.4
O	COMMERCE GROUP CORP	3- 4	3 1/4	0	0.0
O	COMPUTER EXCHANGE	1- 1	1/2	0	0.0
A	COMPUTER INVSTRS GRP	2- 8	3 1/4	0	0.0
O	COMP. INSTALLATIONS	1- 2	1	0	0.0
N	DATRONIC RENTAL	2- 3	1 7/8	0	0.0
A	DCL INC	1- 3	8/5	- 1/8	-15.3
A	DEARBORN-STORM	12- 26	14 1/8	-2 5/8	-10.8
N	DPF INC	3- 9	3 1/8	- 3/4	-10.3
O	ERA RESOURCES	1- 3	1 3/4	0	0.0
A	GRANITE MGT	2- 6	3	- 1/4	-7.0
A	GREYHOUND COMPUTER	3- 6	4	- 1/4	-5.0
A	ITEL	4- 12	8 1/8	0	0.0
N	LEASCO CORP	8- 18	11	- 1/4	-2.2
O	LEASPAC CORP	1- 8	1	0	0.0
O	LECTRO MGT INC	1- 2	1/2	0	0.0
O	NRS INC	4- 15	4 1/8	- 1/8	-2.5
A	PIONEER TEX CORP	5- 8	7 1/2	+ 1/5	+1.6
A	ROCKWOOD COMPUTER	1- 3	1	- 1/4	-25.5
N	U.S. LEASING	16- 36	15 1/4	-2 3/5	-11.5

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH; L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

EXCH		1973 RANGE (1)	CLOSE NOV 21 1973	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 2	1 7/8	- 1/5	-0.2
A	APPLIED DATA RES.	2- 4	2 1/8	0	0.0
O	APPLIED LOGIC	1- 3	1/2	0	0.0
N	AUTOMATIC DATA PROC	39- 94	84	+3 1/2	+6.9
O	BRANDON APPLIED SYST	1- 1	1/2	- 1/4	-33.3
O	CENTRAL DATA SYSTEMS	4- 8	4	-2 1/2	-38.4
O	COMPUTER DIMENSIONS	2- 5	2 5/4	- 1/4	-8.3
O	COMPUTER DYNAMICS	1- 2	1/2	0	0.0
O	COMPUTER HORIZONS	1- 6	2 1/2	0	0.0
O	COMPUTER NETWORK	1- 5	1 1/4	0	0.0
N	COMPUTER SCIENCES	2- 8	2 1/2	0	0.0
O	COMPUTER TASK GROUP	1- 2	1 1/2	+ 1/4	+20.0
O	COMPUTER TECHNOLOGY	1- 5	1	0	0.0
O	COMPUTER USAGE	4- 9	3 7/8	- 1/2	-11.4
O	COMRESS	1- 2	1/4	0	0.0
O	COMSHARE	3- 9	3	- 5/8	-17.2
N	CORDURA CORP	4- 15	3 3/4	- 1/8	-3.2
O	CYBERMATICS INC	1- 3	1 3/8	0	0.0
O	DATATAB	1- 4	1	- 1/8	-11.1
A	ELECT COMP PROG	1- 2	3/4	0	0.0
N	ELECTRONIC DATA SYS.	20- 56	31 3/4	- 3/4	-2.3
O	INFONATIONAL INC	1- 2	1/2	0	0.0
O	INFORMATICS	2- 6	5 5/8	- 3/8	-0.5
O	I.D.A. DATA CORP	1- 1	5/8	+ 1/4	+66.0
O	IPS COMPUTER MARKET.	1- 5	1	- 3/8	-27.2
O	KEANE ASSOCIATES	3- 5	3 1/2	0	0.0
O	KEYDATA CORP	8- 12	5 7/8	- 1/8	-2.0
O	LOGICON	3- 7	2 7/8	- 1/2	-14.6
A	MANAGEMENT DATA	2- 5	1 1/2	- 1/4	-14.2
O	NATIONAL CSS INC	18- 42	27 1/2	-2 1/2	-8.3
O	NATIONAL COMPUTER CO	1- 1	1/4	- 1/8	-33.3
O	NATIONAL INFO SRVCS	1- 2	1/2	0	0.0
P	ON LINE SYSTEMS INC	12- 25	21 1/2	- 1/2	-2.2
N	PLANNING RESEARCH	2- 7	2 5/8	0	0.5
O	PROGRAMMING METHODS	21- 25	21	0	0.0
O	PROGRAMMING & SYS	1- 1	5/8	- 1/8	-16.6
O	RAPIDATA INC	3- 24	4 1/4	+ 1/2	+13.3
O	SCIENTIFIC COMPUTERS	1- 3	5/8	- 1/4	-28.5
O	SIMPLICITY COMPUTER	1- 4	2	+ 1/4	+14.2
O	TRS COMPUTER CENTERS	2- 7	5 1/2	0	0.0
O	TCC INC	1- 1	3/8	+ 1/8	+50.0
O	TYMSHARE INC	6- 13	9 1/4	- 5/8	-6.3
O	UNITED DATA CENTER	3- 8	3	- 1/4	-7.8
A	URS SYSTEMS	3- 8	3	- 7/8	-22.5
N	WYLY CORP	4- 11	4	- 3/4	-15.7

PERIPHERALS & SUBSYSTEMS

EXCH		1973 RANGE (1)	CLOSE NOV 21 1973	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	12- 34	12 1/2	+ 1/4	+2.0
O	ADVANCED MEMORY SYS	5- 23	5 1/4	- 5/4	-12.0
N	AMPEX CORP	4- 7	4	- 1/4	-5.5
O	ANDERSON JACOBSON	3- 6	2 3/4	5	0.0
O	BEEHIVE MEDICAL ELEC	5- 10	5 1/2	5	0.0
A	BOLT,BERANEK & NEW	6- 12	5 3/4	-1 5/8	-15.4
N	BUNKER-RAMO	6- 15	5 1/2	-1 3/8	-13.5
A	CALCOMP	5- 18	8 7/8	-1 1/4	-12.3
S	CAMBRIDGE MEMORIES	5- 17	14	5	5.0
O	CENTRONICS DATA COMP	13- 30	20 3/4	-2 1/4	-5.7
O	CODEX CORP	9- 19	10 1/2	-2	-16.0
S	COGNITRONICS	1- 3	5/8	- 1/5	-16.6
O	COMPUTER COMMUN.	1- 4	7/8	0	0.0
A	COMPUTER EQUIPMENT	2- 3	1 3/4	+ 1/8	+7.6
O	COMPUTER MACHINERY	5- 15	4 5/4	- 3/8	-7.3
O	COMPUTER TRANSCEIVER	1- 8	3/4	- 3/8	-33.3
N	CONRAC CORP	15- 32	15	-1	-6.2
O	DATA ACCESS SYSTEMS	1- 3	1	-1	-80.0
O	DATA 100	9- 19	12 1/4	-1	-7.5
A	DATA PRODUCTS CORP	2- 5	3 3/8	- 1/4	-6.5
O	DATA RECOGNITION	2- 3	1 1/2	0	0.0
O	DATA TECHNOLOGY	2- 5	1 3/4	0	0.0
O	DECISION DATA COMPUT	7- 40	7 1/2	- 1/2	-0.2
O	DELTA DATA SYSTEMS	1- 1	1/2	- 1/8	-20.0
O	DI/AN CONTROLS	1- 4	1 3/4	- 1/2	-22.2
N	ELECTRONIC M & M	5- 8	3 3/4	- 1/4	-6.2
O	FABRI-TEK	2- 5	2 1/2	- 1/8	-4.7
O	GENERAL COMPUTER SYS	5- 8	5 1/4	- 1/2	-8.6
N	GENERAL ELECTRIC	56- 76	62 1/2	-3 1/8	-4.7
N	HAZELTINE CORP	5- 9	5 1/4	- 3/8	-6.6
O	INFOREX INC	4- 23	4 1/4	0	0.0
O	INFORMATION DISPLAYS	1- 2	3/8	0	0.0
O	INFORMATION INTL INC	10- 15	8 3/4	- 1/4	-2.5
A	LUNDY ELECTRONICS	3- 5	2 3/4	0	0.0
O	MANAGEMENT ASSIST	1- 1	1/4	- 1/8	-33.3
N	MEMOREX	2- 10	3 1/8	- 1/2	-13.7
A	MILGO ELECTRONICS	14- 28	16 1/8	-1	-0.2
N	MOHAWK DATA SCI	4- 13	3 3/4	- 1/4	-0.2
O	ODEC COMPUTER SYST.	2- 6	2 1/2	- 3/4	-23.0
O	OPTICAL SCANNING	2- 8	3 1/2	-1	-22.2
O	PERTEC CORP	4- 6	5 1/4	- 1/8	-2.3
O	PHOTON	3- 7	3 3/4	0	0.0
A	POTTER INSTRUMENT	3- 9	3 7/8	- 1/8	-3.1
O	PRECISION INST.	2- 8	2 3/4	- 1/2	-15.3
O	QUANTOR CORP	5- 18	4 1/2	- 1/4	-5.2
O	RECOGNITION EQUIP	5- 8	2 7/8	- 5/8	-17.5
N	SANDERS ASSOCIATES	7- 10	8	- 3/8	-4.4
O	SCAN DATA	1- 8	2	0	0.0
O	STORAGE TECHNOLOGY	11- 34	14 1/2	- 1/2	-3.3
O	SYCOR INC	9- 28	11	+ 1/4	+2.3
O	TALLY CORP.	2- 14	2 3/8	- 7/5	-20.5
O	TEC INC	6- 9	8 1/4	- 1/2	-7.4
N	TEKTRONIX INC	30- 55	40 3/4	-4 3/4	-10.4
N	TELEX	3- 8	3 1/2	- 5/5	-15.1
O	WANGCO INC	7- 13	9	- 1/2	-5.2
O	WILTEK INC	7- 18	8 1/4	- 1/2	-5.7

SUPPLIES & ACCESSORIES

EXCH		1973 RANGE (1)	CLOSE NOV 21 1973	WEEK NET CHNGE	WEEK PCT CHNGE
O	BALTIMORE BUS FORMS	5- 9	7 1/4	-1	-12.1
A	BARRY WRIGHT	8- 13	6 1/8	- 5/8	-5.2
A	DATA DOCUMENTS	17- 26	22	-1	-4.3
O	DUPLEX PRODUCTS INC	7- 18	7 1/4	- 1/2	-6.4
N	ENNIS BUS. FORMS	5- 8	5 1/4	+ 1/8	+2.4
O	GRAHAM MAGNETICS	9- 20	5 1/2	-1 1/2	-13.6
O	GRAPHIC CONTROLS	8- 12	7 5/8	-1 5/5	-17.5
N	3M COMPANY	75- 91	52 1/2	-1 3/4	-2.0
O	MOORE CORP LTD	53- 65	58 1/4	-1 3/4	-2.5
N	NASHUA CORP	42- 55	43 1/2	-2 1/2	-5.4
O	REYNOLDS & REYNOLDS	37- 51	37 1/2	-4 1/2	-10.7
O	STANDARD REGISTER	14- 20	14 1/2	+ 3/4	+5.4
O	TAB PRODUCTS CO	8- 23	5	0	0.0
N	UARCO	15- 23	15	+ 1/4	+1.4
A	WABASH MAGNETICS	5- 8	6	- 1/4	-4.0
N	WALLACE BUS FORMS	15- 26	18 5/8	-1 3/5	-6.5

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